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US005869819A

United States Patent [19]

Knowles et al.

[11] Patent Number: 5,869,819

[45] Date of Patent: Feb. 9, 1999

[54] **INTERNET-BASED SYSTEM AND METHOD FOR TRACKING OBJECTS BEARING URL-ENCODED BAR CODE SYMBOLS**

[75] Inventors: **Carl Harry Knowles**, Morristown; **David Wilz**, Sewell, both of N.J.

[73] Assignee: **Metrologic Instuments Inc.**, Blackwood, N.J.

[21] Appl. No.: **838,501**

[22] Filed: **Apr. 7, 1997**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 820,540, Mar. 19, 1997, which is a continuation-in-part of Ser. No. 753,367, Nov. 25, 1996, which is a continuation-in-part of Ser. No. 645,331, Sep. 24, 1996, which is a continuation-in-part of Ser. No. 615,054, Mar. 12, 1996, which is a continuation-in-part of Ser. No. 573,946, Dec. 18, 1995, which is a continuation-in-part of Ser. No. 292,237, May 17, 1994, Pat. No. 5,808,285, which is a continuation-in-part of Ser. No. 365,193, Dec. 28, 1994, which is a continuation-in-part of Ser. No. 293,493, Aug. 19, 1994, Pat. No. 5,525,789, which is a continuation-in-part of Ser. No. 561,479, Nov. 20, 1995, Pat. No. 5,661,192, which is a continuation-in-part of Ser. No. 278,109, Nov. 24, 1995, Pat. No. 5,884,982, which is a continuation-in-part of Ser. No. 489,305, Jun. 19, 1995, abandoned, which is a continuation-in-part of Ser. No. 476,069, Jun. 7, 1995, Pat. No. 5,591,953, and Ser. No. 584,135, Jan. 11, 1996, Pat. No. 5,616,908.

[51] **Int. Cl.**[6] **G06K 07/10**

[52] **U.S. Cl.** **235/375**; 235/462

[58] **Field of Search** 235/462, 472, 235/454, 375, 380, 494, 384; 209/584, 900

[56] **References Cited**

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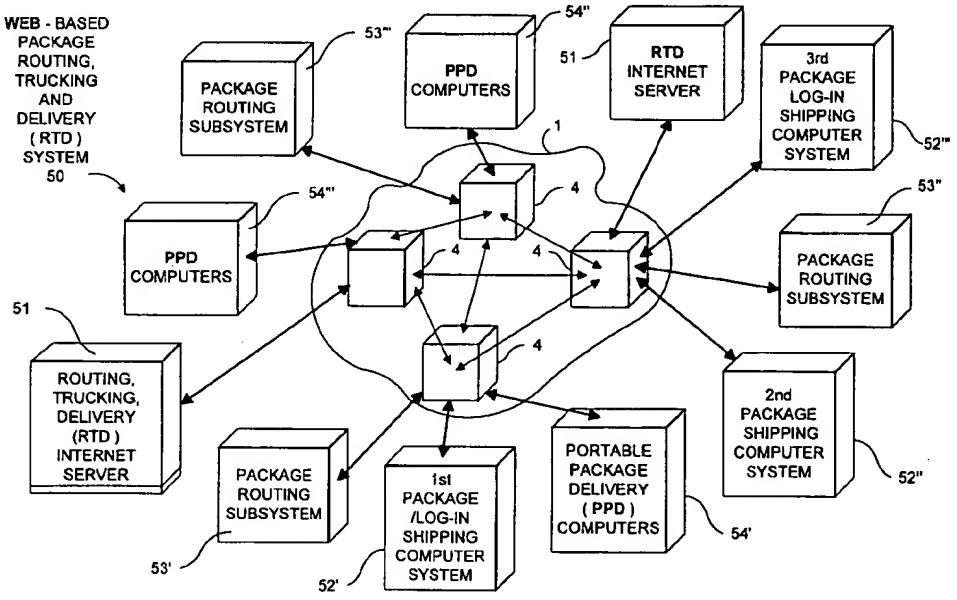
Primary Examiner—Thien Minh Le

Attorney, Agent, or Firm—Hopgood, Calimafde, Kalil & Judlowe, LLP

[57] **ABSTRACT**

A novel Web-based package routing, tracking and delivering system and method that uses URL/ZIP-CODE encoded bar code symbols on parcels and packages. The system comprises one or more Routing, Tracking and Delivery (RTD) Internet Server Subsystems connected to the Internet infrastructure and updated at any instant of time with package tracking information. A Package Log-In/Shipping Subsystem is located at each shipping location and connected to the RTD Internet Server by way of the Internet infrastructure. A Package Routing Subsystem is located at a hub station and connected to the RTD Internet Server by way of the Internet infrastructure. A Portable Package Delivery Subsystem is carried by each package delivery person, and connected to the RTD Internet Server by way of the Internet infrastructure communication link. At each remote hub station within the system, the URL/ZIP-CODE encoded bar code symbol is automatically scanned by way of the Internet infrastructure; the encoded destination Zip Code is locally recovered and used to route the package at the hub station; and the locally recovered URL is used to access the RTD Internet Server and update the location of the package within the system. The Portable Package Delivery Subsystem is used to read the URL/ZIP-CODE encoded bar code symbol near the delivery destination in order to access the RTD Internet Server and display delivery information and the like to facilitate the delivery process.

10 Claims, 15 Drawing Sheets



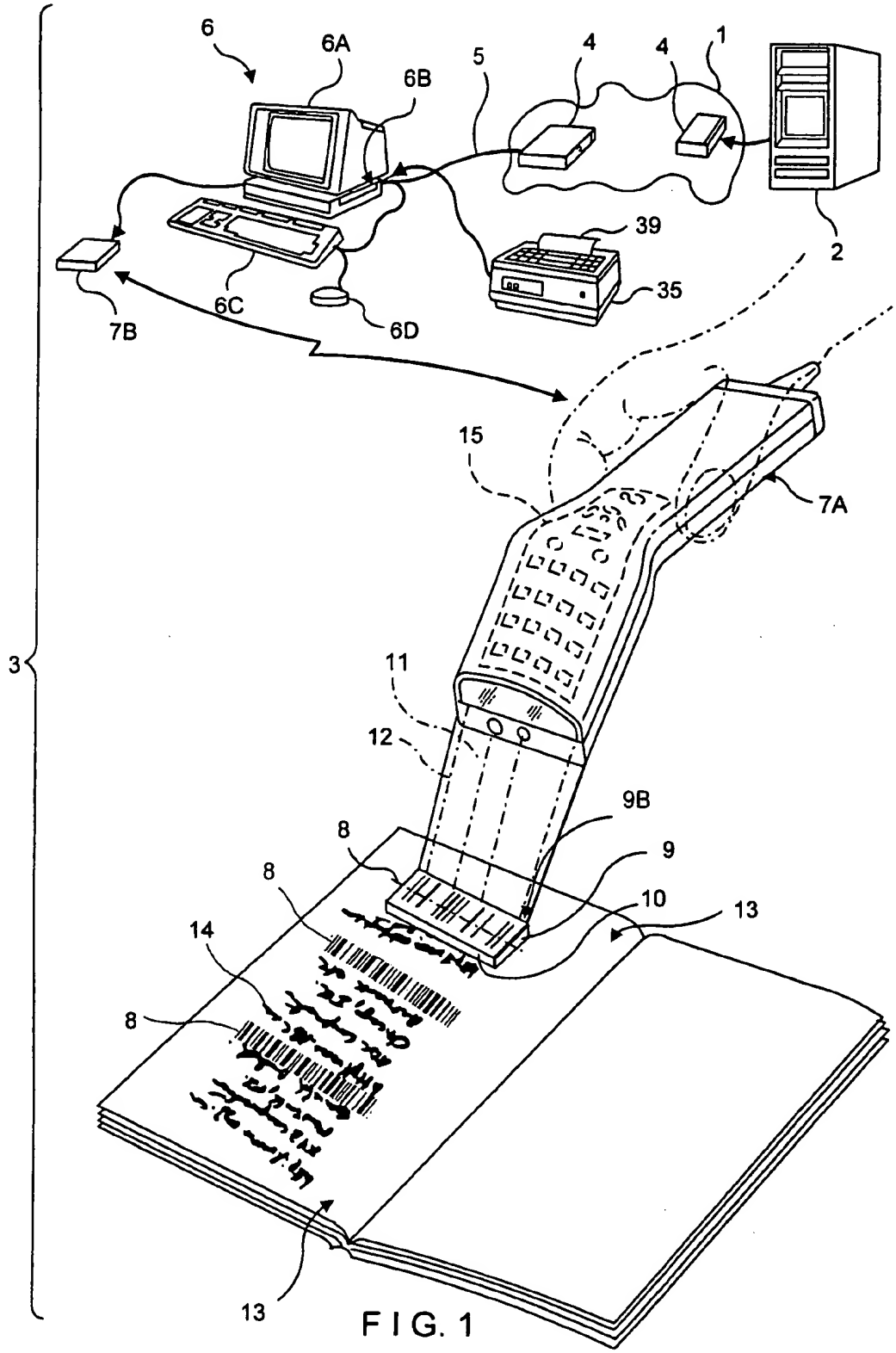


FIG. 1

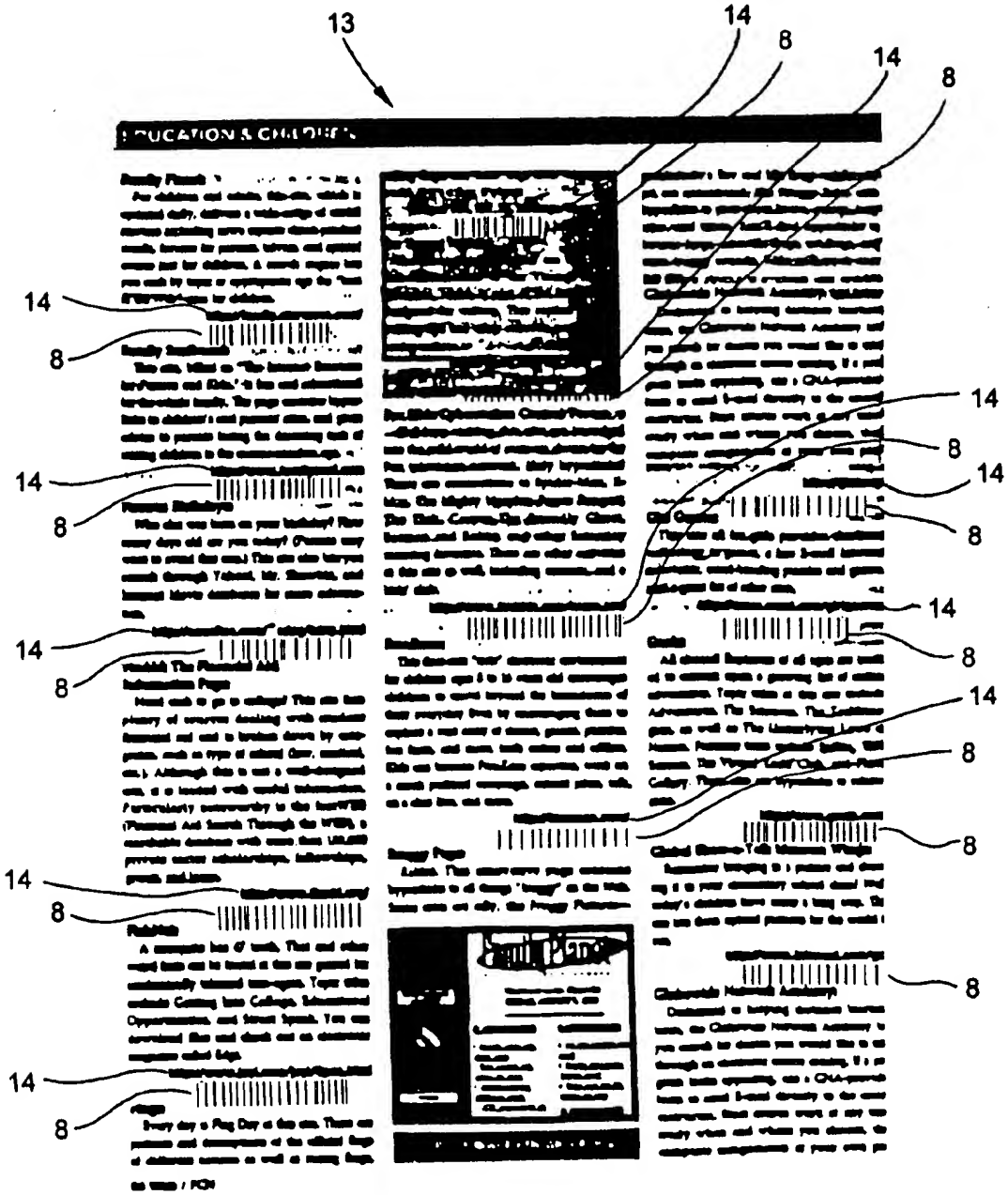


FIG. 1A

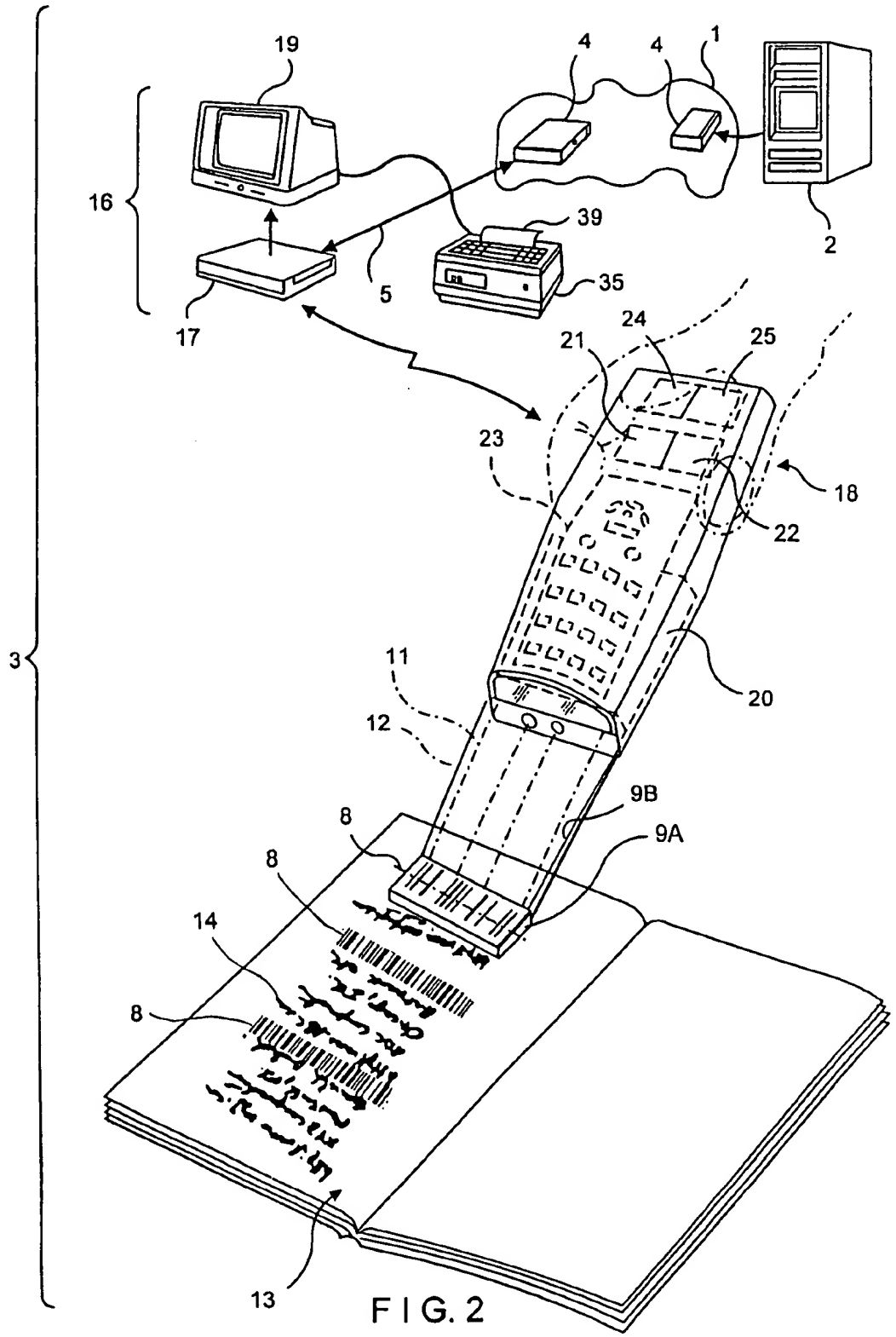


FIG. 2

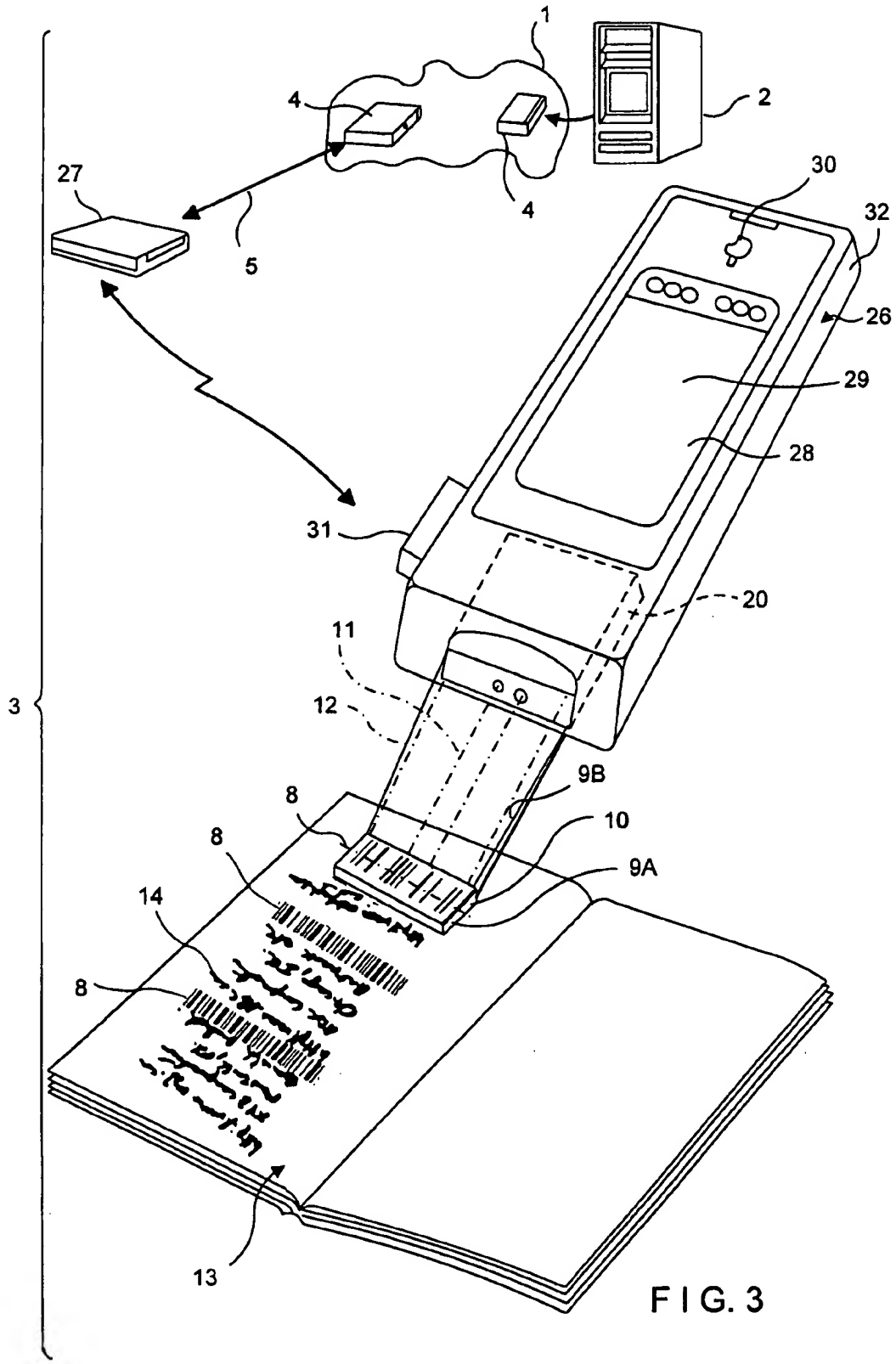


FIG. 3

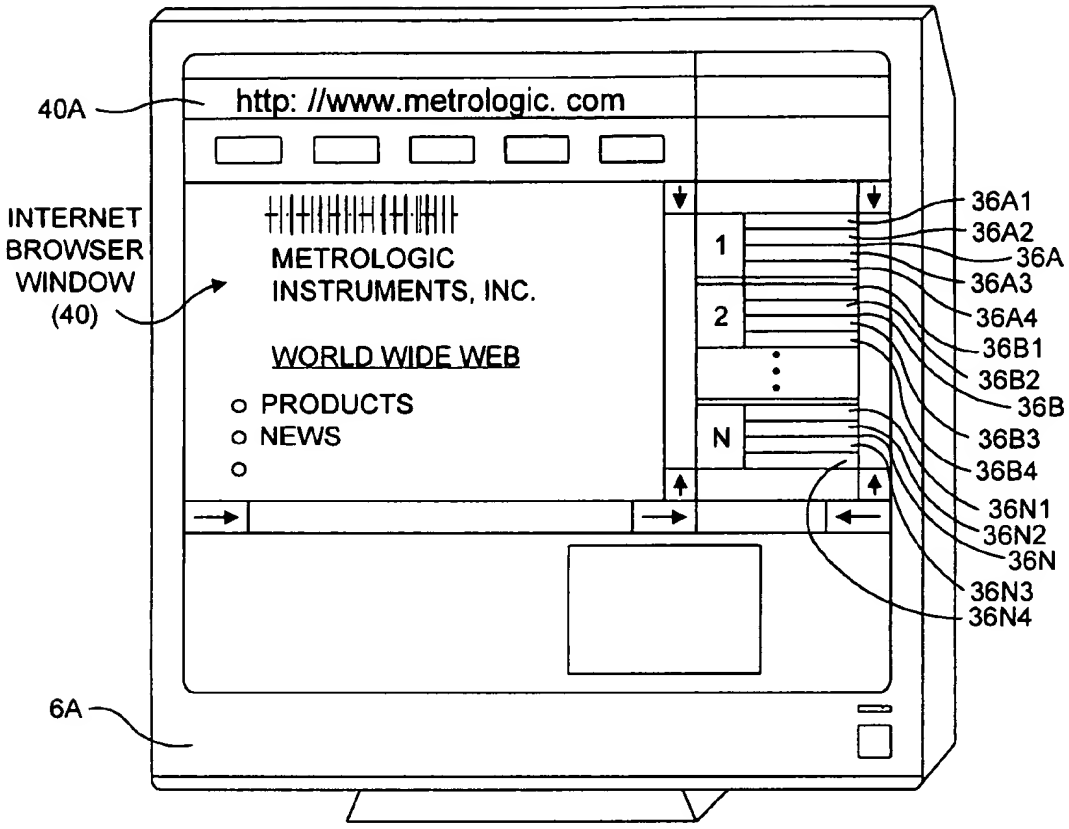

40A
http: //www.metrologic. com
INTERNET BROWSER WINDOW (40)
METROLOGIC INSTRUMENTS, INC.
WORLD WIDE WEB
o PRODUCTS
o NEWS
o
1
2
N
36A1
36A2
36A
36A3
36A4
36B1
36B2
36B
36B3
36B4
36N1
36N2
36N
36N3
36N4
6A

FIG. 4

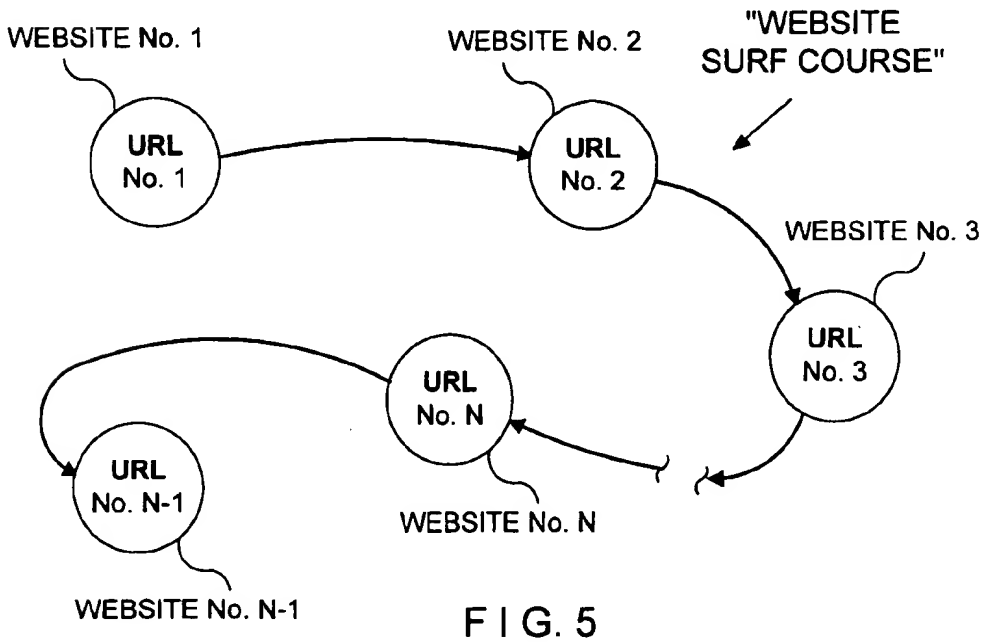

WEBSITE No. 1
WEBSITE No. 2
"WEBSITE SURF COURSE"
URL No. 1
URL No. 2
WEBSITE No. 3
URL No. 3
URL No. N
URL No. N-1
WEBSITE No. N
WEBSITE No. N-1

FIG. 5

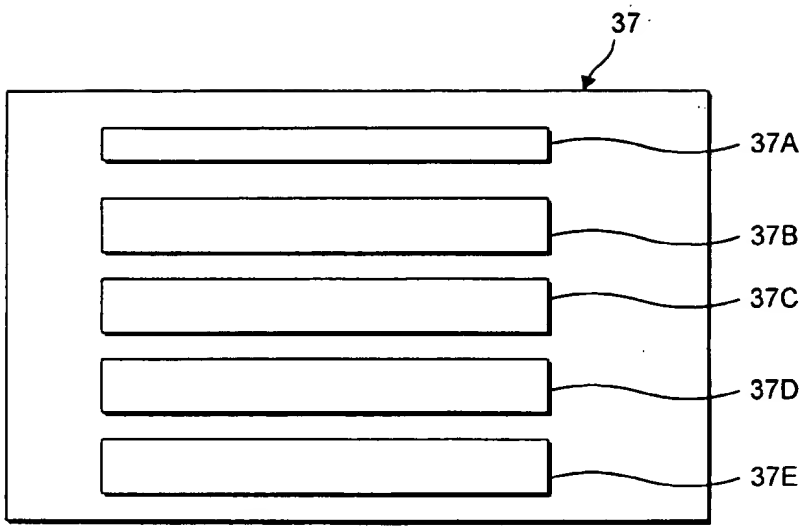

37
37A
37B
37C
37D
37E

FIG. 6A

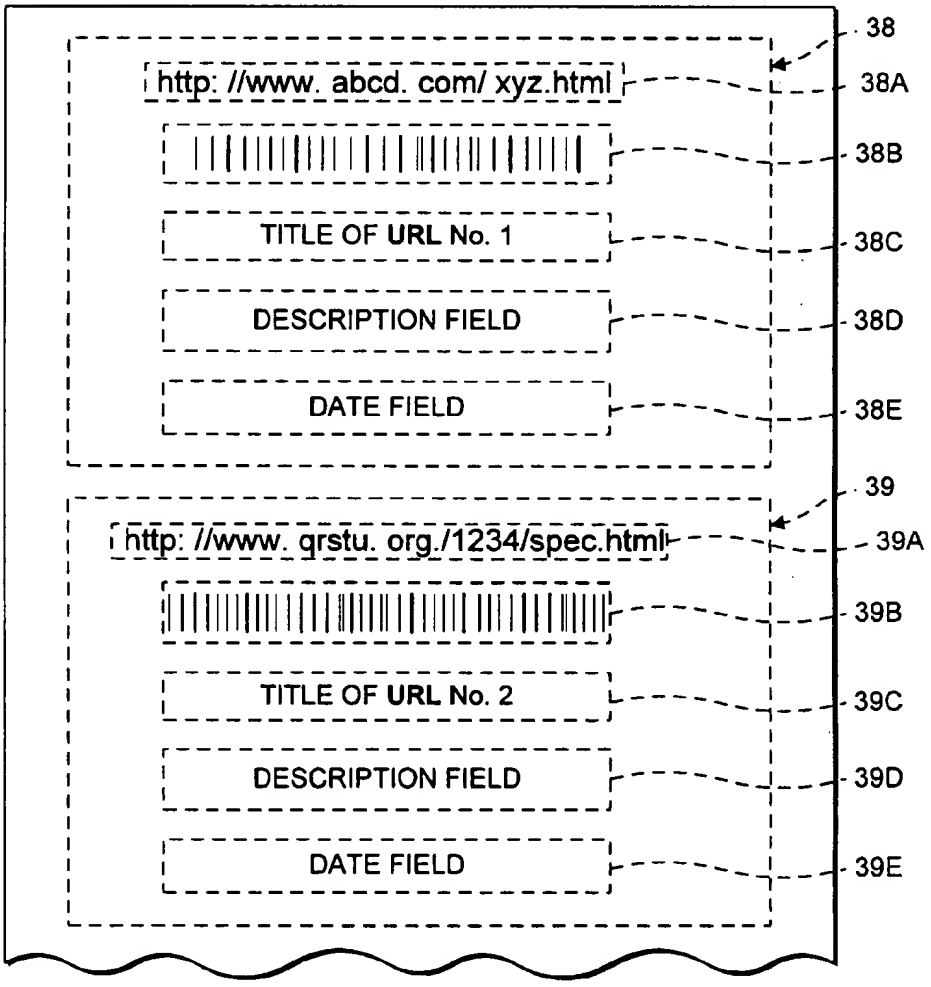

38
http: //www. abcd. com/ xyz.html
38A
38B
TITLE OF URL No. 1
38C
DESCRIPTION FIELD
38D
DATE FIELD
38E
39
http: //www. qrstu. org./1234/spec.html
39A
39B
TITLE OF URL No. 2
39C
DESCRIPTION FIELD
39D
DATE FIELD
39E

FIG. 6B

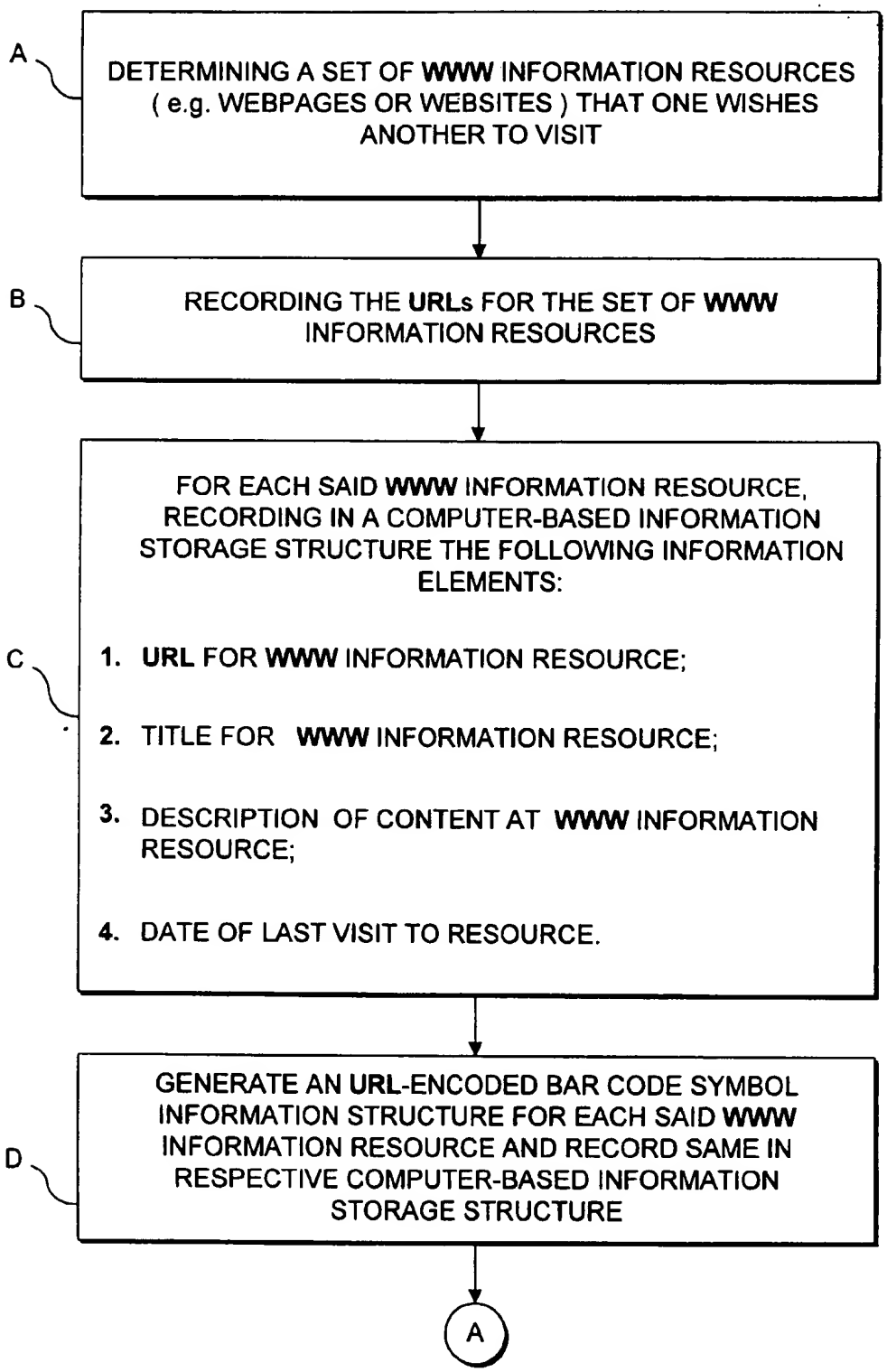

A
DETERMINING A SET OF WWW INFORMATION RESOURCES (e.g. WEBPAGES OR WEBSITES) THAT ONE WISHES ANOTHER TO VISIT
B
RECORDING THE URLs FOR THE SET OF WWW INFORMATION RESOURCES
C
FOR EACH SAID WWW INFORMATION RESOURCE, RECORDING IN A COMPUTER-BASED INFORMATION STORAGE STRUCTURE THE FOLLOWING INFORMATION ELEMENTS:
1. URL FOR WWW INFORMATION RESOURCE;
2. TITLE FOR WWW INFORMATION RESOURCE;
3. DESCRIPTION OF CONTENT AT WWW INFORMATION RESOURCE;
4. DATE OF LAST VISIT TO RESOURCE.
D
GENERATE AN URL-ENCODED BAR CODE SYMBOL INFORMATION STRUCTURE FOR EACH SAID WWW INFORMATION RESOURCE AND RECORD SAME IN RESPECTIVE COMPUTER-BASED INFORMATION STORAGE STRUCTURE
A

FIG. 7A

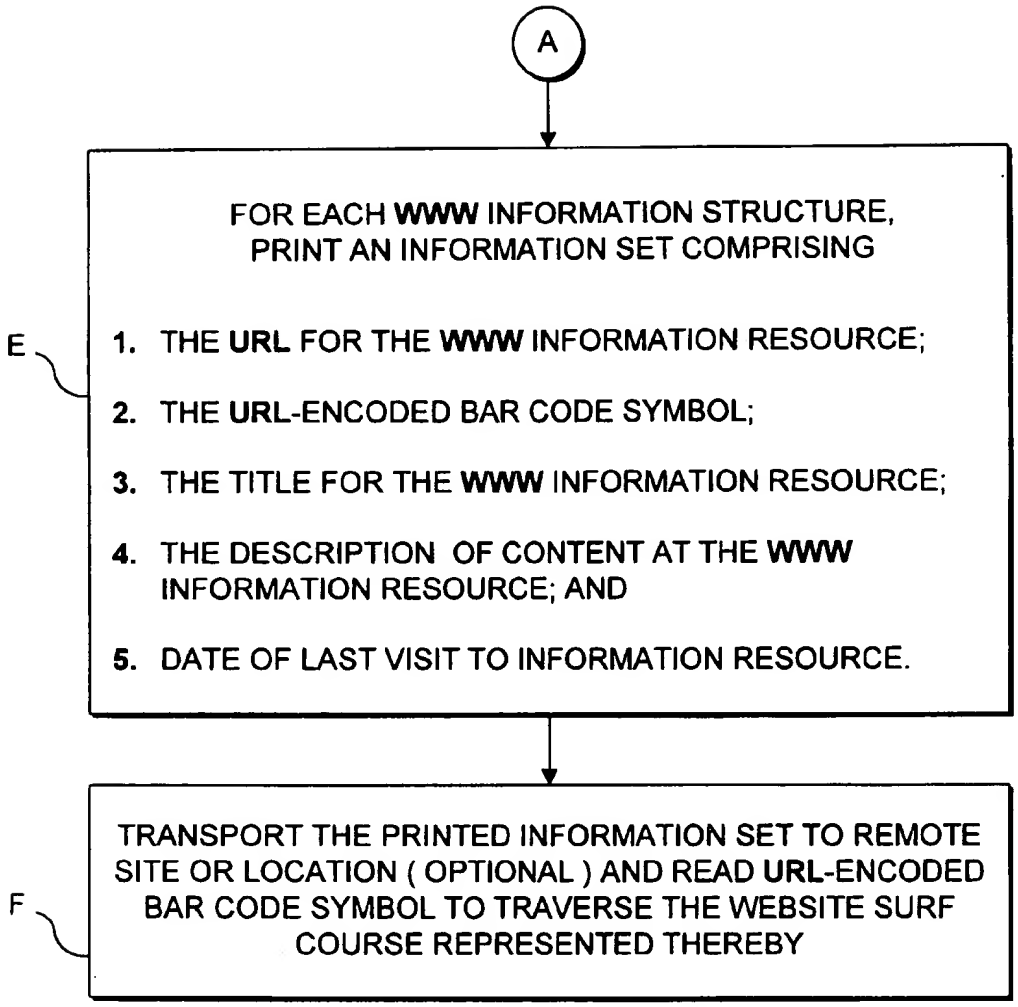

A
FOR EACH WWW INFORMATION STRUCTURE, PRINT AN INFORMATION SET COMPRISING
E
1. THE URL FOR THE WWW INFORMATION RESOURCE;
2. THE URL-ENCODED BAR CODE SYMBOL;
3. THE TITLE FOR THE WWW INFORMATION RESOURCE;
4. THE DESCRIPTION OF CONTENT AT THE WWW INFORMATION RESOURCE; AND
5. DATE OF LAST VISIT TO INFORMATION RESOURCE.
F
TRANSPORT THE PRINTED INFORMATION SET TO REMOTE SITE OR LOCATION (OPTIONAL) AND READ URL-ENCODED BAR CODE SYMBOL TO TRAVERSE THE WEBSITE SURF COURSE REPRESENTED THEREBY

FIG. 7B

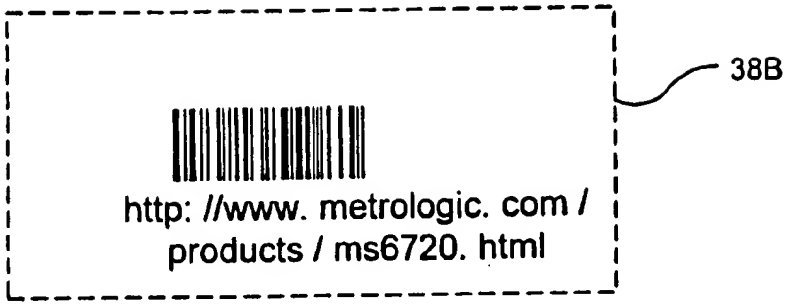

38B
http: //www. metrologic. com /
products / ms6720. html

FIG. 8

38B
http: //www. metrologic.com /
/ products / ms6720. html

FIG. 9

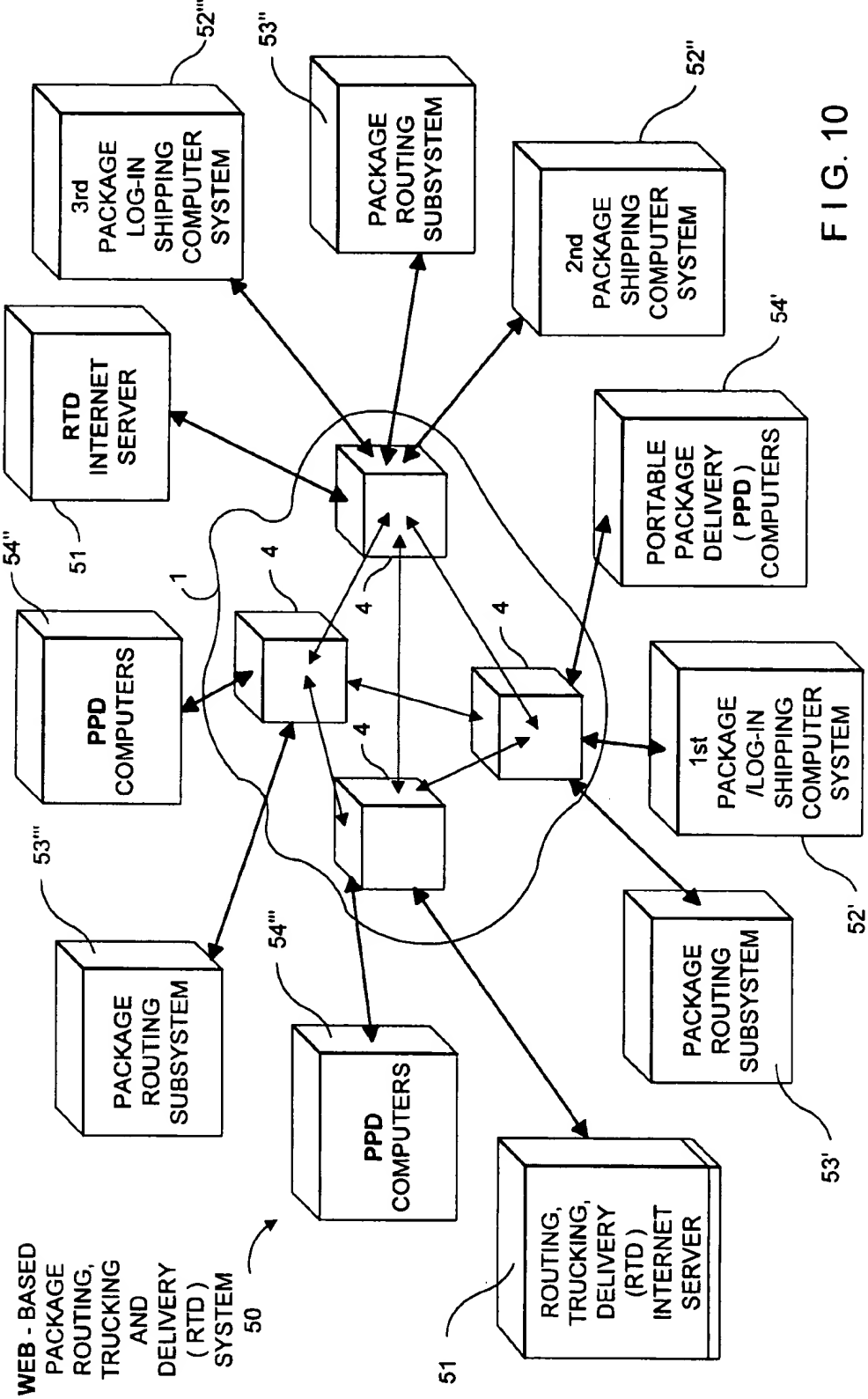

WEB - BASED PACKAGE ROUTING, TRUCKING AND DELIVERY (RTD) SYSTEM
50
ROUTING, TRUCKING, DELIVERY (RTD) INTERNET SERVER
51
PPD COMPUTERS
54'''
PACKAGE ROUTING SUBSYSTEM
53'''
PACKAGE ROUTING SUBSYSTEM
53'
1st PACKAGE /LOG-IN SHIPPING COMPUTER SYSTEM
52'
PORTABLE PACKAGE DELIVERY (PPD) COMPUTERS
54'
2nd PACKAGE SHIPPING COMPUTER SYSTEM
52''
PACKAGE ROUTING SUBSYSTEM
53''
3rd PACKAGE LOG-IN SHIPPING COMPUTER SYSTEM
52'''
RTD INTERNET SERVER
51
PPD COMPUTERS
54''
1
4
4
4
4

FIG. 10

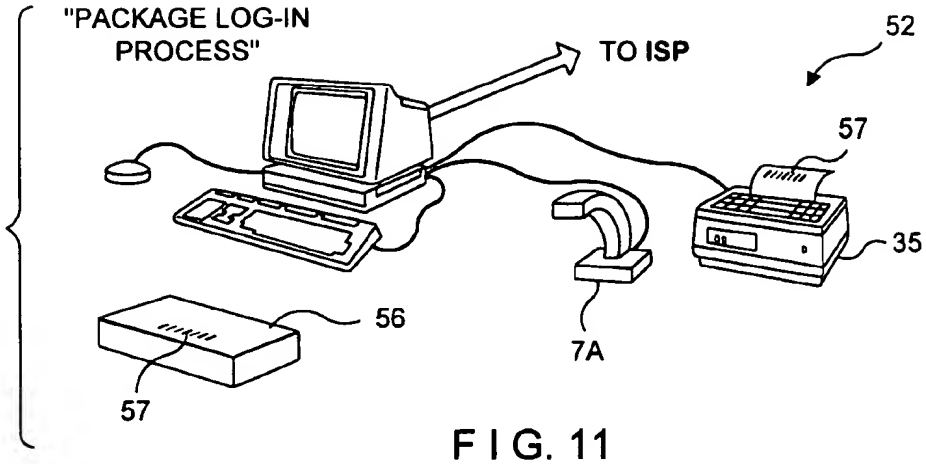


FIG. 11

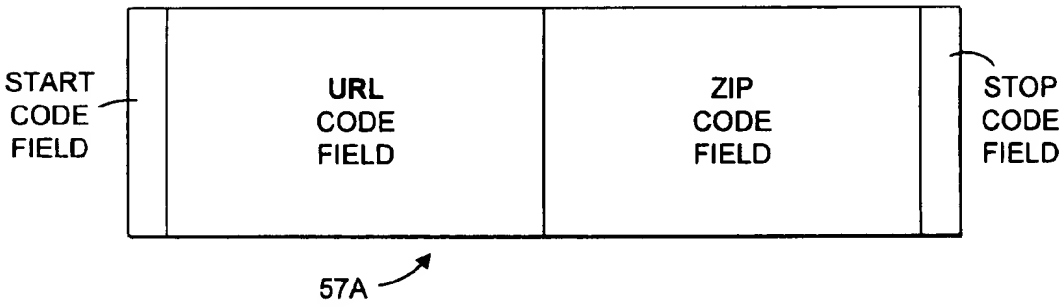


FIG. 12A

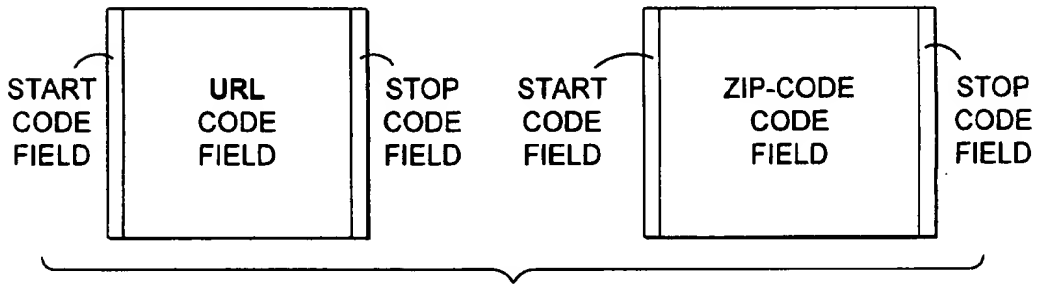


FIG. 12B

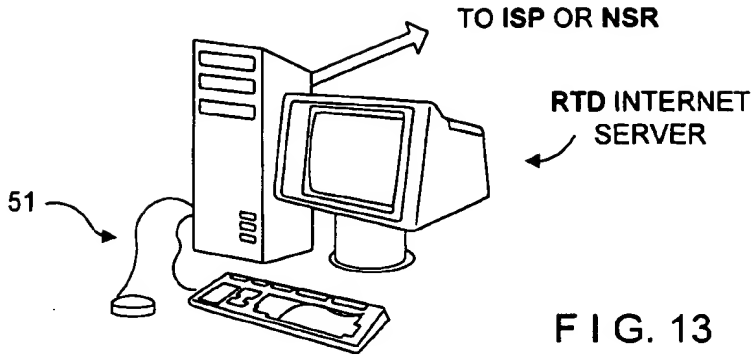


FIG. 13

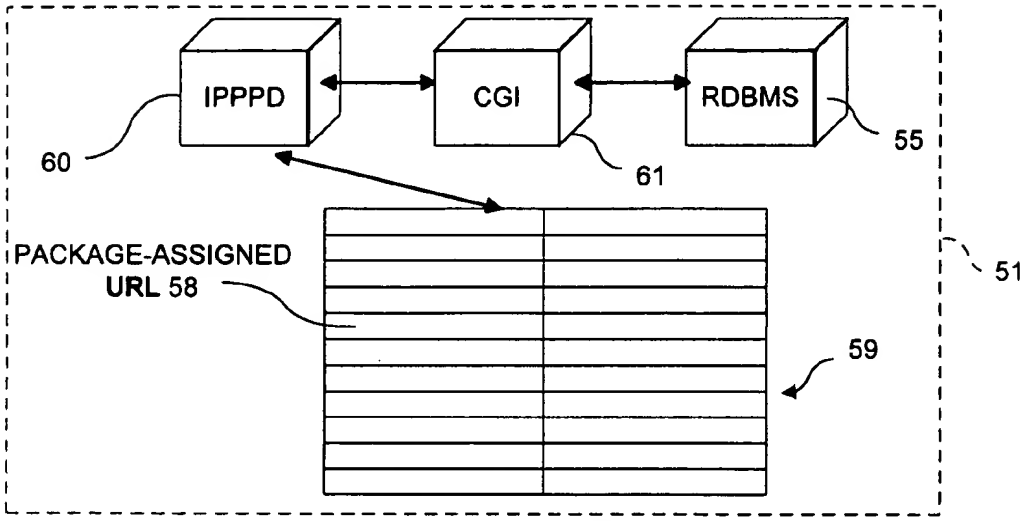


FIG. 13A

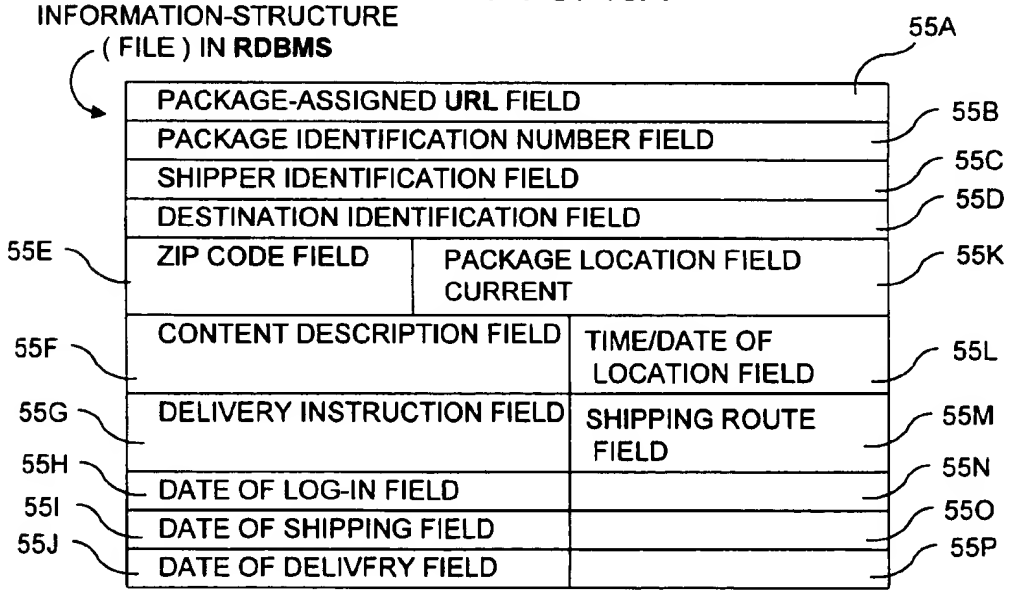
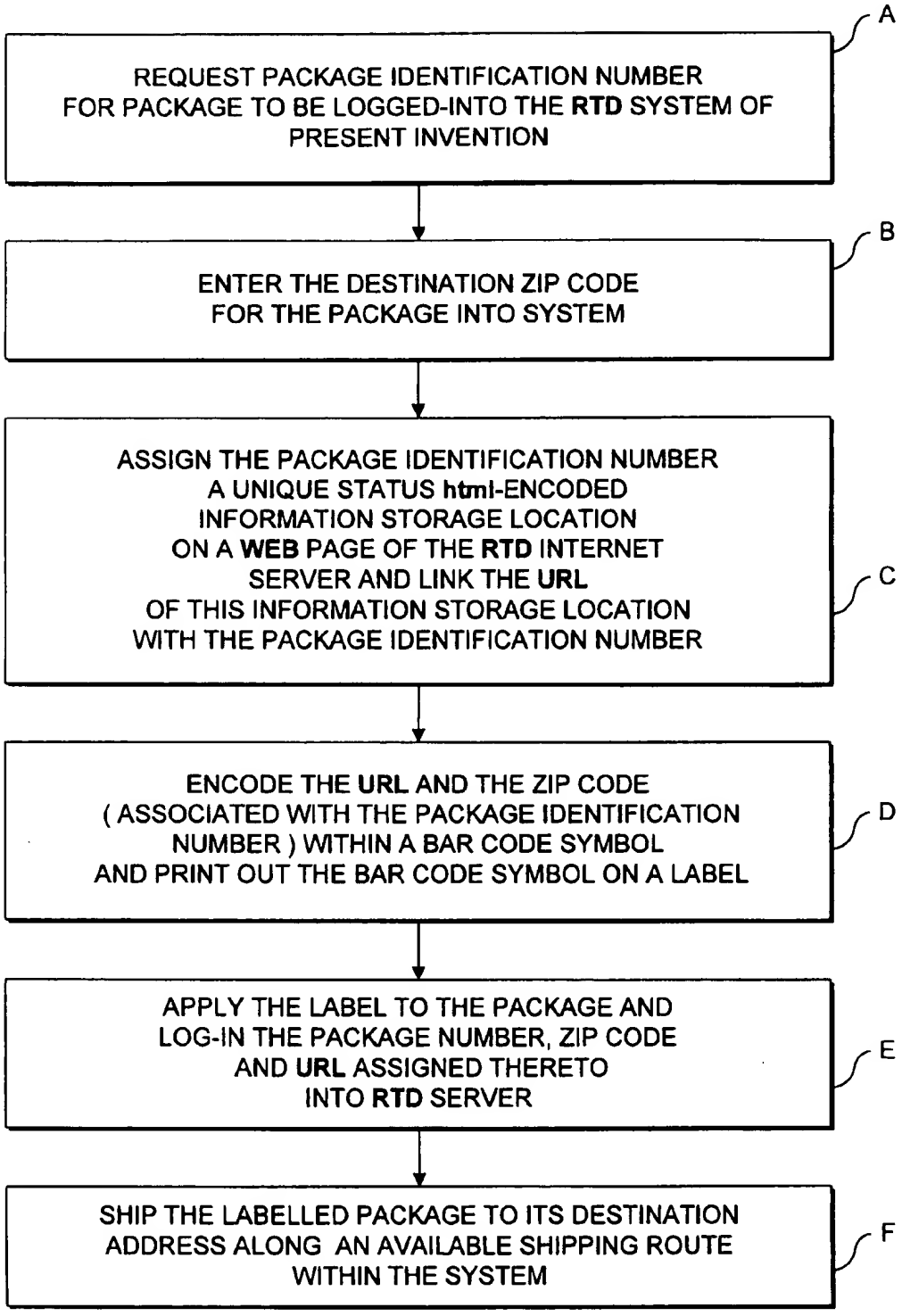


FIG. 13B



"PACKAGE LOG-IN PROCESS"

FIG. 14

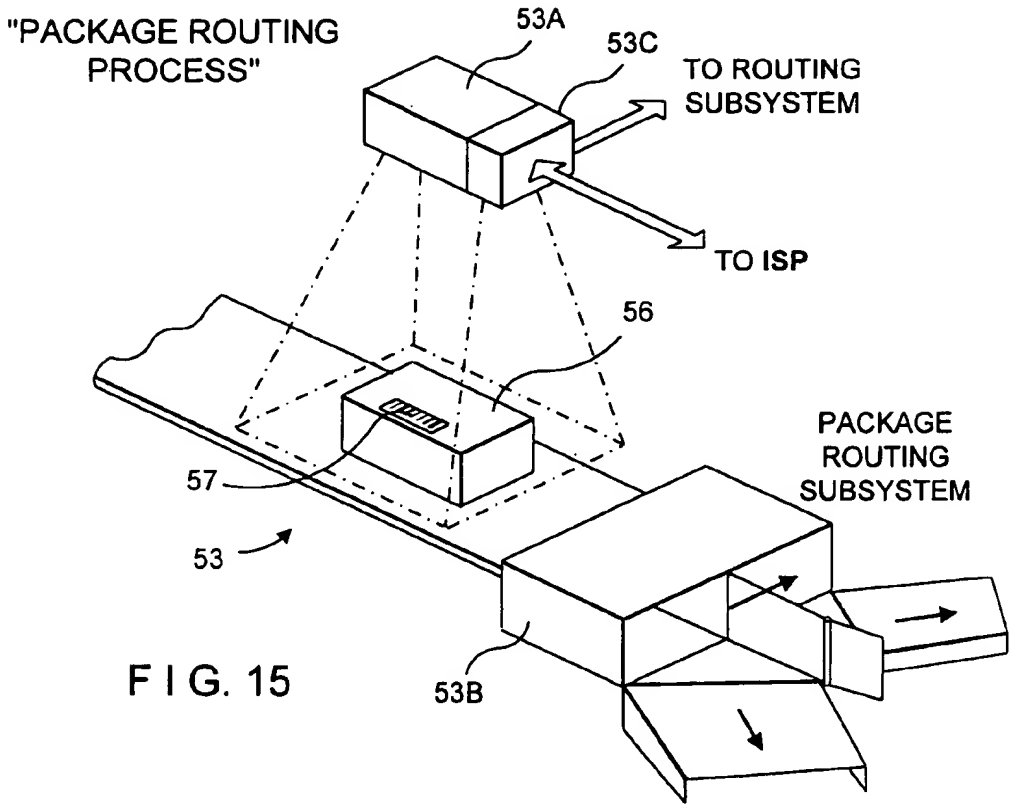

"PACKAGE ROUTING PROCESS"
53A
53C
TO ROUTING SUBSYSTEM
TO ISP
56
PACKAGE ROUTING SUBSYSTEM
57
53
53B

FIG. 15

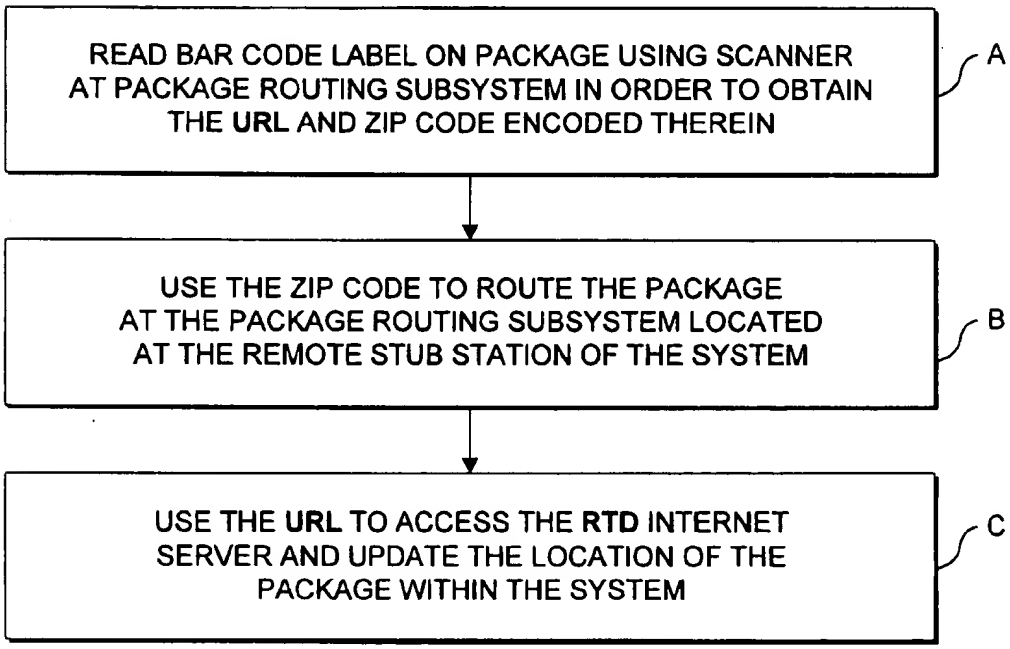

READ BAR CODE LABEL ON PACKAGE USING SCANNER AT PACKAGE ROUTING SUBSYSTEM IN ORDER TO OBTAIN THE URL AND ZIP CODE ENCODED THEREIN
A
USE THE ZIP CODE TO ROUTE THE PACKAGE AT THE PACKAGE ROUTING SUBSYSTEM LOCATED AT THE REMOTE STUB STATION OF THE SYSTEM
B
USE THE URL TO ACCESS THE RTD INTERNET SERVER AND UPDATE THE LOCATION OF THE PACKAGE WITHIN THE SYSTEM
C

FIG. 16

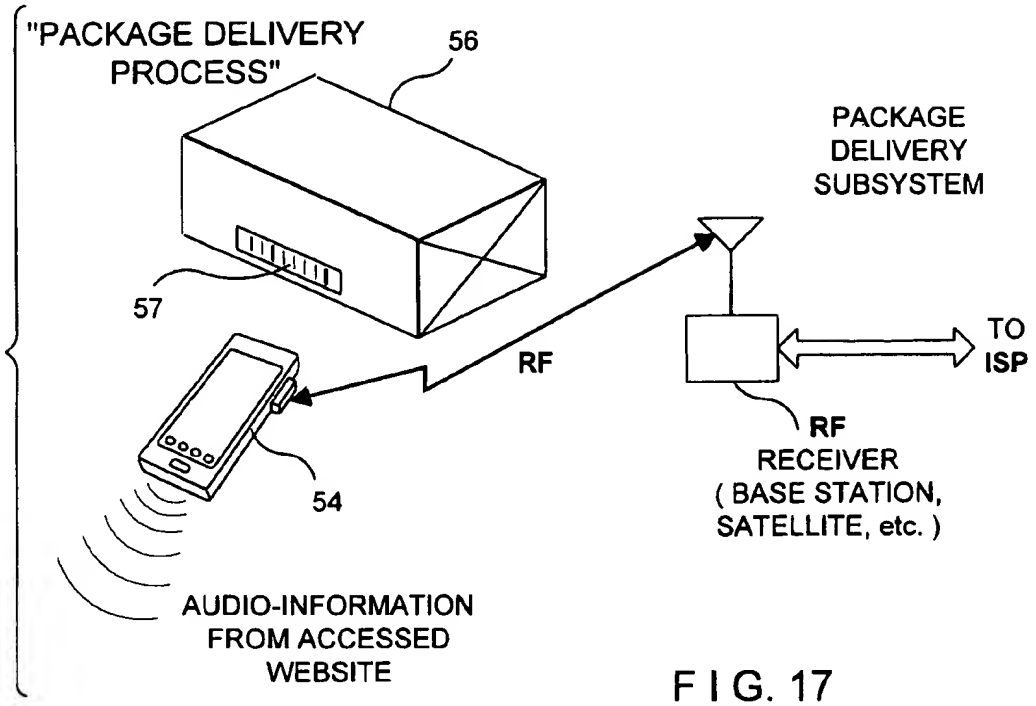

"PACKAGE DELIVERY PROCESS"
56
PACKAGE DELIVERY SUBSYSTEM
57
RF
TO ISP
RF RECEIVER (BASE STATION, SATELLITE, etc.)
54
AUDIO-INFORMATION FROM ACCESSED WEBSITE

FIG. 17

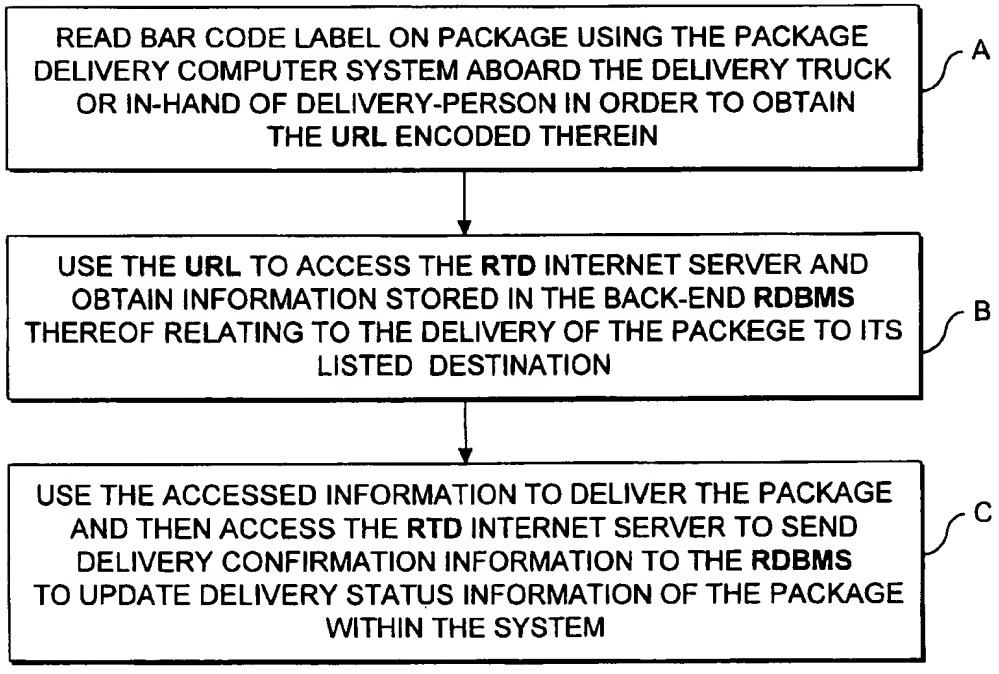

READ BAR CODE LABEL ON PACKAGE USING THE PACKAGE DELIVERY COMPUTER SYSTEM ABOARD THE DELIVERY TRUCK OR IN-HAND OF DELIVERY-PERSON IN ORDER TO OBTAIN THE URL ENCODED THEREIN
A
USE THE URL TO ACCESS THE RTD INTERNET SERVER AND OBTAIN INFORMATION STORED IN THE BACK-END RDBMS THEREOF RELATING TO THE DELIVERY OF THE PACKEGE TO ITS LISTED DESTINATION
B
USE THE ACCESSED INFORMATION TO DELIVER THE PACKAGE AND THEN ACCESS THE RTD INTERNET SERVER TO SEND DELIVERY CONFIRMATION INFORMATION TO THE RDBMS TO UPDATE DELIVERY STATUS INFORMATION OF THE PACKAGE WITHIN THE SYSTEM
C

FIG. 18

INTERNET-BASED SYSTEM AND METHOD FOR TRACKING OBJECTS BEARING URL-ENCODED BAR CODE SYMBOLS

RELATED CASES

This Application is a Continuation-in-Part of: application Ser. No. 08/820,540 entitled "System And Method For Composing And Printing URL-Encoded Bar Code Symbol Lists And Menus For Use In Visiting Internet-Based Information Resources By Scanning The Same" by Harry Knowles, filed Mar. 19, 1997, which is a CIP of application Ser. No. 08/753,367 filed Nov. 25, 1996; CIP of application Ser. No. 08/645,331 filed Sep. 24, 1996; CIP of application Ser. No. 08/615,054 filed Mar. 12, 1996; CIP of application Ser. No. 08/573,949 filed Dec. 18, 1995; CIP of application Ser. No. 08/292,237 filed May 17, 1994 now U.S. Pat. No. 5,808,235; CIP of application Ser. No. 08/365,193 filed Dec. 28, 1994; CIP of application Ser. No. 08/293,493 filed Aug. 19, 1994 now U.S. Pat. No. 5,525,789; CIP of application Ser. No. 08/561,479 filed Nov. 20, 1995 now U.S. Pat. No. 5,661,282; CIP of application Ser. No. 08/278,109 filed Nov. 24, 1995 now U.S. Pat. No. 5,884,382; CIP of application Ser. No. 08/489,305 filed Jun. 9, 1995 now abandoned; CIP of Ser. No. 08/476,069 filed Jun. 7, 1995 now U.S. Pat. No. 5,891,953; and CIP of application Ser. No. 08/584,135 filed Jan. 11, 1996 now U.S. Pat. No. 5,616,908. Each said patent application is assigned to and commonly owned by Metrologic Instruments, Inc. of Blackwood, N.J., and is incorporated herein by reference in its entirety.

BACKGROUND OF INVENTION

1. Field of Invention

The present invention is directed to a novel bar-code symbol driven Internet scanning terminal, and method of surfing the Internet by scanning bar code symbols encoded with the Uniform Resource Locators (URLs) indicating the location of information resources on the Internet to be explored or accessed, and novel means and ways of tracking objects bearing such URL-encoded bar code symbols.

2. Background of the Invention

Presently, several techniques have been developed for connecting to (i.e., "surfing" among) Internet-based information resources on the World Wide Web (WWW) using a conventional graphical user interface (GUI) based Internet browser programs, such as the Navigator® from Netscape Communications, Inc. or the Internet Explorer® from Microsoft, Inc. The availability of any particular Web-site surfing technique depends on where the Internet user finds him or her self in the Internet browser program at any particular instant of time.

For example, if one is currently at a Web-site (i.e., in a particular HyperText Markup Language (HTML) document), at which there is a highlighted or embedded "link" specifying the Internet address of another Web-site (i.e., another HTML document), then the user can "surf to" this other Web-site by simply "clicking on" or selecting the highlighted URL with his or her pointing device (i.e., "mouse") in a conventional manner. The ability to connect to other Web-sites by simply pointing and clicking on a highlighted URLs embedded in an HTML document has contributed enormously to the growth and popularity of the Internet in the last few years.

If the user desires to connect to a Web-site that is not referenced in a HTML document viewed through a browser program, then the user oftentimes finds it necessary to manually enter the URL of the Web-site (e.g., "http://www.metrologic.com") into the browser program. This requires manually pressing a sequence of keys on a keyboard or remote control device, corresponding to the characters of the URL being selected. In addition to being time consuming, this Web-site surfing technique is prone to errors, causing the browser program to connect to the wrong Web-site or return a message stating that the Domain Name of the Web-site sought after cannot be found. From practical point of view, this is quite frustrating to the Internet user.

More recently, with the growth and ever increasing complexity of the WWW, it is becoming popular to use printed publications (e.g., magazines, catalogues, directories, etc.) which list Web-site, corresponding URLs and content descriptions, as navigational aids, much in same way that the TV GUIDE® magazine is used to help viewers select programs during television viewing. Again, however, each time a listed Web-site is to be viewed, the user is forced to manually enter into the Internet browser program, the lengthy character string associated with the URL of the Web-site being selected. Only thereafter, does the browser program automatically connect the user's client system (i.e., Internet Terminal) to the Internet Server computer supporting the selected Web-site.

While the development of HTML and GUI-based Web browser programs have made accessing Web-sites quite simple, the above shortcomings and drawbacks of prior art Internet technology clearly indicate a great need in the art for an improved system and method of surfing to Web-sites on the Internet.

OBJECTS AND SUMMARY OF THE PRESENT INVENTION

Accordingly, it is a primary object of the present invention to provide an improved method and apparatus for surfing among information resources on the Internet while avoiding the shortcomings and drawbacks of prior art systems and methodologies.

A further object of the present invention is to provide an Internet Scanning System which includes an bar code symbol reader for reading URL-encoded bar code symbols printed on various types of print media which, when read thereby, automatically connects the Internet Scanning System to the Internet Server that contains the information resource specified by the scanned URL-encoded bar code symbol.

A further object of the present invention is to provide such Internet Scanning System, wherein the bar code symbol reader may be a laser scanning bar code symbol reader, a CCD bar code symbol, or a Wand-type bar code symbol reader.

A further object of the present invention is to provide such an Internet Scanning System, wherein the URL-encoded bar code symbol printed on various types of print media is a URL-encoded truncated-type bar code symbol, having a very low height to length ratio, thereby allowing many URL-encoded bar code symbols to be printed on a single sheet or page of a Web-site guide, along with their corresponding human-readable URLs and content descriptions.

Another object of the present invention is to provide such an Internet Scanning System in the form of a desktop, laptop or palmtop computer system that is connected to the Internet by way of an Internet Service Provider (ISP), wherein the computer system has a GUI-based web browser program and a programmed bar code symbol scanner interfaced therewith for automatically surfing to information resource

(e.g., Web-sites) listed in a Web-site guide by simply scanning corresponding URL-encoded bar code symbols printed on the pages thereof.

A further object of the present invention is to provide an Internet Scanning System in the form of an interactive web-based television system, wherein the web-based television system comprises a Internet terminal unit connected to the Internet by way of an ISP, an audio-visual display monitor for displaying graphical and audio information content of Web-sites, and a portable Internet surfing device having a wireless IR-based communication link to the Internet terminal unit and an integrated bar code symbol scanner for automatically surfing to (or among) Web-sites listed in a Web-site guide by simply scanning corresponding URL-encoded bar code symbols printed on the pages thereof.

A further object of the present invention is to provide such an Internet Scanning System in the form of a Scanner Integrated Terminal, wherein the Scanner Integrated Terminal is connectable to the Internet by way of a wireless (RF) link to an ISP, and has an integrated GUI-based web browser program, display panel, keypad, and programmed bar code symbol scanner for automatically surfing to Web-sites listed in a Web-site guide by simply scanning corresponding URL-encoded bar code symbols printed on the pages thereof.

Another object of the present invention is to provide a novel method of surfing to Web-sites on the Internet by scanning URL-encoded bar code symbols into GUI-based web browser programs, without the need of manual data entry operations or the like.

A further object of the present invention is to provide an Internet Scanning System, which includes an optical character reader programmed to read the character strings of URLs printed on various types of print media which, when read thereby, automatically connects the Internet Client System to the Internet Server that supports the Web-site specified by the read URL.

Another object of the present invention is to provide such an Internet Scanning System in the form of a desktop, laptop or palmtop computer system that is connected to the Internet by way of an Internet Service Provider (ISP), wherein the computer system has a GUI-based web browser program and a programmed optical character reader interfaced therewith for automatically surfing to Web-sites listed in a Web-site guide by simply reading corresponding URLs printed on the pages thereof.

A further object of the present invention is to provide an Internet Scanning System in the form of an interactive web-based television system, wherein the web-based television system comprises an Internet terminal unit connected to the Internet by way of an ISP, an audio-visual (AV) display monitor for displaying graphical and audio information content of Web-sites, and a portable Internet surfing device having a wireless IR-based communication link to the Internet Terminal unit and an integrated optical character reader for automatically surfing to Web-sites listed in a Web-site guide by simply scanning corresponding URLs printed on the pages thereof.

A further object of the present invention is to provide such an Internet Scanning System in the form of a Scanner Integrated Terminal, wherein the Scanner Integrated Terminal is connectable to the Internet by way of a wireless (RF) link to an ISP, and has an integrated GUI-based web browser program, display panel, keypad, and programmed optical character reader for automatically surfing to Web-sites listed in a Web-site guide by simply scanning corresponding URLs printed on the pages thereof.

Another object of the present invention is to provide a novel method of surfing to Web-sites on the Internet by optically scanning the character strings of URLs into GUI-based web browser programs, without the need of manual data entry operations and the like.

Another object of the present invention is to provide a novel system and method for printing URL-encoded bar code symbols on various types of print media which, when read thereby, automatically connects the Internet Client System to the Internet Server that supports the Web-site specified by the scanned URL-encoded bar code symbol.

Another object of the present invention is to provide such a system in the form of suitably programmed desktop Web-linked computer workstation or laptop computer system having a graphical user interface and an Internet browser program having a plug-in type URL-Menu Composition/Printing Module that supports the bar code menu composition, transmission and printing processes of the present invention.

A further object of the present invention is to provide such as system, in which the Internet browser program and plug-in URL-Menu Composition/Printing Module allows the user to easily compile the following information structure during operation of the Internet browser program: a list of human-readable URLs corresponding to a set or course of information serving Web-sites, a set of URL-encoded bar code symbol data structures corresponding thereto, a set of titles assigned to the URLs, a set of brief descriptions of content served at the Web-sites, and date or dates the set of Web-sites were last visited by the compiler, for subsequent printing in the form of menu.

A further object of the present invention is to provide a such a system, in which the compiled information structure can be electronically transmitted to a remote site, by e-mail, facsimile transmission, or other protocol available over the Internet, and thereafter printed out using appropriate print-driver software, so that the Web-sites listed in the compiled information structure can easily visited by reading the corresponding URL-encoded bar code symbol into the Internet browser program using a bar code scanner.

Another object of the present invention is to provide a novel Web-site guide or directory comprising one or more sheets having a plurality of URL-encoded bar code symbols, corresponding human-readable URLs and Web-site content descriptions printed thereon.

Another object of the present invention is to provide a novel Web-based document tracking and management system, in which each printed document (e.g., brochure, drawing, 3-D objects or specimens, photograph, specification, blue-print, and the like) to be tracked and managed within the system is uniquely assigned and affixed with a printed URL-encoded bar code symbol that specifies (i.e., points to) a particular information storage location within an HTML-encoded relational database management system (RDBMS), realized on an Web-based information server located on the Internet or behind the corporate firewall of an HTTP-supporting Intranet.

Another object of the present invention is to provide such a Web-based document tracking and management system, in which information relating to a document registered within the system can be easily accessed therefrom by simply scanning the printed URL-encoded bar code symbol on the document using the bar code symbol reader associated with an Internet scanning terminal (i.e., client computer system) of the present invention.

Another object of the present invention is to provide such a Web-based document tracking and management system, in which the Internet scanning terminal of each user can be used to: (1) assign a URL-encoded bar code symbol to any document to be registered with the system; (2) enter document-related information into the information storage location assigned to the document within the Web-based RDBMS; (3) print out URL-encoded bar code symbols for attachment to corresponding documents registered within the system; (4) modify at any time the document-related information currently stored in the information storage location assigned to the document within the Web-based RDBMS; and (5) access such document related information from the system by simply reading its corresponding URL-related bar code symbol.

Another object of the present invention to provide a Web-based package routing, tracking and delivering system and method that uses URL-encoded bar code symbols on parcels and packages.

A further object of the present invention is to provide such a Web-based package routing, tracking and delivery system and method, wherein one or more Routing, Tracking and Delivery (RTD) Internet Server Subsystems are connected to the Internet and updated at any instant of time with package related information produced by either (i) a Package Log-In/Shipping Subsystem that is located at a product shipping location (e.g., warehouse) and connected to the RTD Internet Server by a first data communication link, (ii) a Package Routing Subsystem that is located at a hub station and connected to the RTD Internet Server by a second data communication link, or (iii) a Portable Package Delivery Subsystem that is carried by the package delivery person and connected to the RTD Internet Server by a wireless data communication link.

A further object of the present invention is to provide such a Web-based package routing, tracking and delivery system and method, wherein at each remote hub station within the system: the URL/Zip Code encoded bar code symbol is automatically scanned; the encoded destination Zip Code is locally recovered and used to route the package at the hub station; and the locally recovered URL is used to access the RTD Internet Server and update the location of the package within the system.

Another object of the present invention is to provide such a Web-based package routing, tracking and delivery system and method, wherein when the URL/Zip Code Encoded bar code symbol is read by the deliveryman or courier using a portable (wireless) Internet Scanning Terminal, the recovered URL is used to automatically access the RTD Internet Server and display on the Internet Scanning Terminal, precise up-to-date parcel delivery information, payment-method terms, handling instructions and the like.

These and other Objects of the Present Invention will become apparent hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of how to practice the Objects of the Present Invention, the following Detailed Description of the Illustrative Embodiments should be read in conjunction with the accompanying Drawings, wherein:

FIG. **1** is a schematic diagram of the first illustrative embodiment of the present invention, in which the Internet Scanning System hereof is realized in the form of a desktop computer system shown connected to the Internet by way of an ISP, and having a GUI-based web browser program and a bar code symbol scanner for automatically surfing to Web-sites listed in a Web-site guide by simply scanning corresponding URL-encoded bar code symbols printed on the pages thereof;

FIG. **1A** is schematic representation of a single sheet or page of the Web-site Directory of the present invention, showing several URL-encoded (truncated) bar code symbols printed thereon along with their corresponding human-readable URLs and content descriptions;

FIG. **2** is a schematic diagram of the second illustrative embodiment of the present invention, in which the Internet Scanning System hereof is realized in the form of an interactive web-based television system which comprises a Terminal Unit shown connected to the Internet by way of an ISP and has portable Internet Navigation (i.e., Surfing) Device having an IR-link to the Terminal Unit, and a bar code symbol scanner integrated therewith for automatically surfing to Web-sites listed in a Web-site guide by simply scanning corresponding URL-encoded bar code symbols printed on the pages thereof;

FIG. **3** is a schematic diagram of the third illustrative embodiment of the present invention, in which the Internet Scanning System hereof is realized in the form of a hand-held Scanner Integrated Terminal shown connected to the Internet by way of a wireless link to an ISP, and having an integrated GUI-based web browser program, display panel, keypad, and programmed bar code symbol scanner for automatically surfing to Web-sites listed in a Web-site guide by simply scanning corresponding URL-encoded bar code symbols printed on the pages thereof;

FIG. **4** is a schematic representation of an exemplary window of an Internet browser program running on the system of FIG. **1**, and also an exemplary window for the URL-menu CTP Module plug-in of the present invention allowing its user to compose, transmit and print URL-encoded menus according to the principles of the present invention;

FIG. **5** is a schematic representation of an exemplary sequence of Web-sites along a Web-site "surf course" that are to be digested within a URL-encoded menu composed and printed according to the present invention;

FIG. **6A** is a schematic representation of an exemplary portion of an information storage structure for a URL-encoded Menu, showing the various information storage fields contained therein;

FIG. **6B** is a schematic representation of an exemplary section of the URL-encoded Menu of FIG. **6A**, showing the various information display fields contained therein;

FIGS. **7A** and **7B** provide a flow chart setting forth the steps carried out during the execution of the illustrative embodiment of the Bar Code Menu Composition, Transmission and Printing Module of the present invention;

FIG. **8** is a graphical representation of an exemplary 2-D URL-encoded bar code symbol of the PDF417 Symbology, encoded according to the principles of the present invention;

FIG. **9** is a graphical representation of an exemplary "multiple 1-D" URL-encoded bar code symbol structure according to the present invention, comprising a stack of discrete URL-encoded bar code symbols of the Code **93** Symbology, encoded according to the principles of the present invention;

FIG. **10** is a schematic diagram of the Web-Based Package Routing, Tracking and Delivery (RTD) System of the Present Invention showing a plurality of RTD Internet Servers connected to the Internet infrastructure, a plurality of Package Routing Subsystems located at remote hub

stations of the system and connected to the RTD Internet Servers by way of the Internet infrastructure, a plurality of Log-In Shipping Computer Subsystems located at product shipping locations throughout the world and connected to the RTD Internet Servers by way of the Internet infrastructure, and a plurality of Portable Package Delivery (PPD) Computer-Based Subsystems with wireless connection to the RTD Internet Servers;

FIG. **11** is a schematic representation of a Package Log-in/Shipping Computer-Based Subsystem of the Web-based RTD System of the present invention;

FIG. **12A** is a schematic diagram showing the various information fields of a first, preferred illustrative embodiment of a URL/ZIP-CODE encoded bar code symbol for use with the RTD system hereof;

FIG. **12B** is a schematic diagram showing the various information fields of a second illustrative embodiment of URL/ZIP-CODE encoded bar code symbol for use with the RTD system hereof;

FIG. **13** is a schematic representation of a RTD Internet Server (Subsystem) of the Web-based RTD System of the present invention;

FIG. **13A** is a schematic representation of the information architecture of the RTD Internet Server of the Web-based RTD System of the present invention, showing its relational database management system (RDBMS), Common Gateway Interface (CGI), and HTTP Server serving an HTML-encoded web-page having URL-specified information storage fields represented therein;

FIG. **13B** is a schematic representation of an information structure comprising information elements stored in the RDBMS of the RTD Internet Server that are linked to an information storage location in an HTML-encoded web-page which is specified by a Uniform Resource Locator (URL) that has been uniquely assigned to a particular package being tracked within the RTD system of the present invention;

FIG. **14** is a flow chart illustrating the steps carried out at the Package Log-In/Shipping Subsystems during a package logging-in operation within the RTD system of the present invention;

FIG. **15** is a schematic diagram of a Package Routing Subsystem located at a routing hub within the RTD system of the present invention, shown scanning a URL/ZIP-CODE encoded bar code symbol on a shipped package being routed therewithin;

FIG. **16** is a flow chart illustrating the steps carried out at each Package Routing Subsystem upon the reading of a URL/ZIP-CODE encoded bar code symbol on a package during a package routing operation within the RTD system of the present invention;

FIG. **17** is a schematic diagram of a Portable Package Delivery Subsystem of the present invention shown scanning the URL/ZIP-CODE encoded bar code symbol on a shipped package during a package delivery operation within the RTD system of the present invention; and

FIG. **18** is a flow chart illustrating the steps carried out during a package delivery operation using a Portable Package Subsystem of the present invention.

DETAILED DESCRIPTION OF THE ILLUSTRATIVE EMBODIMENTS OF THE PRESENT INVENTION

The illustrative embodiments of the present invention will be described with reference to the figure drawings wherein like elements and structures are indicated by like reference numbers.

In general, the system and method of the present invention is practiced in connection with a globally-based digital telecommunications network (known as the Internet). The function of the Internet is to provide an infrastructure that supports wired and wireless digital telecommunications throughout the world using the well known TCP/IP networking protocols. In general, the Internet infrastructure comprises Internet Service Providers (ISPs), Network Service Providers (NSPs), routers, telecommunication lines and channels. etc., all well known in the art.

Connected to the Internet **1** by way of the Internet infrastructure (i.e., ISPs and NSPs) are many Internet Web-site Servers (i.e., computer systems) **2** that are physically located throughout the world and whose function is to serve information to Internet users when requested by client computer systems (i.e., client systems) **3**. In general, each Internet Web-site Server **2** and client system **3** may be connected to the infrastructure by way of an ISP **4** (or NSP) using physical communication media or a wireless (RF-based) digital communication link **5** well known in the art. Notably, while each illustrative embodiment of the Internet Scanning System hereof is realized in the form of a Client System operably connected to the infrastructure of the Internet by way of an ISP, it is understood that the Internet connection may be achieved through an NSP or access point in the Internet infrastructure.

In the illustrative embodiments, each Internet Web-site Server **2** is realized as a computer system running conventional Web-site server software (e.g., WebStar® from StarNine, Inc.) and is interfaced with an ISP in a conventional manner. Each Internet Web-site Server is assigned a unique TCP/IP address (and Domain Name) on the Internet, and is provided with Internet networking software to support the TCP/IP protocol. In addition, each Internet Web-site server is provided with one or more application software programs for creating and maintaining hypermedia documents containing text, graphics and audio information within an information file structure expressed in HTML. Each HTML document on the WWW is physically stored in an Internet Server **2**. The location of such information storage on the WWW is specified by a Uniform Resource Locator (URL), the syntax of which is well known in the art. The function of a URL is best illustrated by way of example. Metrologic Instruments, Inc., the assignee of the present invention, has launched a WWW site having a "home page" (i.e., first page) specified by the following URL: "http://www.metrologic.com". The type of information maintained at this Web-site, beginning with Metrologic's home page, can be virtually any type of information (of a multi-media nature) and typically will be updated over time to reflect changes in either the company, its products, services and the like. The same is generally true for each and every other Web-site on the Internet, regardless of the type of information being served to client systems.

As illustrated in FIG. **1**, the first illustrative embodiment of the Internet Scanning System hereof is realized in the form of a desktop computer system **6**. As shown, the desktop computer system consisting of a video monitor **6A**, a processor **6B**, keyboard **6C**, mouse **6C**, and Postcript® laser printer **35**, is connected to the Internet by way of an ISP **4**. The computer system **6** has a GUI-based web browser program and a hand-held, wireless laser scanning bar code symbol reading system **7** which is connected to the communication port of this host system in a conventional manner. In the preferred embodiment, wireless bar code symbol reading system **7** comprises a hand-supportable laser scanning bar code symbol reading device **7A** and a base unit

7B which receives RF signals transmitted from device 7A upon the successful reading of each bar code symbol thereby; the base unit 7B produces an acoustical acknowledgement signal in response to each such successful read. System 7 can be realized by any one of the (i) wireless bar code symbol reading systems disclosed in copending application Ser. No. 08/292,237 filed Aug. 17, 1994, or (ii) tethered bar code symbol reading systems disclosed in copending application Ser. Nos. 08/476,069 and 08/660,643, each said application being incorporated herein by reference.

The function of the programmed bar code symbol reader 7 is to read a bar code symbol 8 that is encoded with the URL of a Web-site to be accessed by the Internet Scanning System, and produce symbol character data representative of the URL. As used hereinafter, this special type of bar code symbol shall be referred to as a "URL-Encoded Bar Code Symbol". The information structure of this symbol character string should be formatted so that it corresponds to the syntactical structure of the URL and is thus readily utilizable by any conventional GUI-based Internet browser program, such as the Navigator® from Netscape or the Internet Explorer® from Microsoft. In order to provide such conventional browser programs with scanned-data input capabilities, a Plug-in Module (e.g., browser subprogram) can be readily written and installed within the browser program. The function of the Plug-In module is to: (i) automatically read scanned URL information stored within an addressed data buffer at the I/O port of the client computer platform (supporting the Internet Scanning Terminal) 6; (ii) automatically write the URL information (in an appropriate format) to the data buffer assigned to the URL entry window 40A of the Internet browser display Screen 40 shown in FIG. 4; and then (iii) automatically initiate the HyperText Transmission Protocol (HTTP) over the Internet (without user input or intervention) in order to connect to the associated Internet Server and access the information resource located at the URL realized therein. While it is preferred that each Internet Scanning System of the present invention has a preloaded Internet browser program provided with the above-described plug-in module, or the functionalities provided thereby, it may be desirable in some instances to distribute or down-load the browser program to client computer systems from an Internet-based Information Server on the WWW using the well known file transmission protocol (FTP). In this way, conventional client computer systems can be converted into Internet Scanning Terminals according to the present invention.

Once the Internet Scanning Terminal is provided with an Internet browser program with the above-described plug-in module of functionalities, bar code symbol reader (e.g., a Metrologic Scanner MS951-48 with keyboard wedge) 7 is connected to the data-input port of the client computer platform 6 so that URLs encoded in printed bar code symbols can be automatically entered as input into the Internet browser program by simply reading the printed URL-encoded bar code symbols. Whenever new URL information is provided to the Internet browser program by bar code symbol scanning, the particular information resource corresponding to the URL is automatically accessed by the Internet Scanning System of the present invention. Such Internet access operations are achieved by the Internet browser program cooperating with the addressed Internet Server and carrying out HTTP in a manner well known in the art.

In general, each URL-encoded bar code symbol of the present invention can be either a linear (1-D) or 2-D bar code symbol structure of virtually any symbology that allows for the encoding of the (ASCII-type) information contained within a URL-type information structure, the syntax of which is well known in the art. In the preferred embodiment, the URL-Encoded Bar Code Symbol 8 is realized as a truncated-type bar code symbol constructed using any one of the following bar code symbologies: Code 128; full ASCII character set of Code 39; and Code 93. Preferably, each such bar code symbol is printed above, below or alongside each Web-site URL 14 or its listing in a Web-site guide or directory. Method and apparatus for composing and printing such bar code symbols lists and menus will be described in greater detail hereinafter. In general, the URL-encoded bar code symbol can be of any length. Notably, the advantage of using the truncated bar code symbol structure is that the height of the bars and spaces is relatively short in relation to the length of the bar code, thus allowing the URL-encoded truncated Symbol 8 to be easily printed with each Web-site listing printed on crowded pages of printed Web-site guides and catalogues, as illustrated in FIG. 1A.

In accordance with the present invention, Web-site listings and menus, in which URL-encoded bar code symbols may be printed, include various types of printed guides, directories or publications which digest, catalogue, organize or otherwise list WWW sites or information resources that exist on Web-site Servers throughout the Internet. Examples of such printed Web-site publications include, for example: the "WWW Yellow Pages" (1996) published by the New Riders Publishers, Inc.; "PC NOVICE GUIDE TO THE WEB: How to find anything on the Web" (1996) published by Peed Corporation; "Cybersurfer", published by Starlog Group, Inc.; "Internet Underground", published by Ziff-Davis; "Internet User", published by Ziff-Davis; "Internet World", published by Mecklermedia; "The Net", published by Imagine Publishing; "Net Guide", published by CMP Media; "Online Access", published by Red Flash Internet; "The Web", published by International Data Group; "Websight", published by New Media, Inc.; "Yahoo Internet Life", published by Ziff-Davis and Yahoo; WebTV Guides; or any other printed publication that one may desire to use to look up Web-sites (of interest) that one would like to visit (surf to) and explore.

As shown in FIGS. 1 and 1A, the programmed bar code symbol scanner 7 of the Internet Scanning System of the first illustrative embodiment is particularly designed so that closely nested Web-site listings on a single page can be read without inadvertently reading undesired URL-encoded bar code symbols. This added scanning control feature is achieved in the bar code symbol reader of FIG. 1 by providing the automatic laser scanning bar code symbol reader 7A with an optically-transparent scanning plate 9A supported from reader 7A by an optically transparent extension 9B. The scanning plate 9A has formed therein a sighting window (i.e., aperture) 10, through which a URL-encoded bar code symbol 8 is automatically scanned and read when such a printed symbol (on a substrate) is aligned with the sighting aperture. In this particular embodiment of the bar code symbol reader 7A, the IR-based object detection field 11 extends just slightly beyond the sighting window 10 so that the laser scanning by laser beam 12 is automatically initiated only when an object (e.g., Web-site Guide) 13 is placed up against the sighting window 10, as when the scanning plate is brought in contact with URL-Encoded Bar Code Symbol 8 associated with a particular Web-site listing, shown in FIG. 1A. The design and construction details associated with automatic bar code symbol reader 7A can be found in Applicant's prior U.S. application Ser. No. 08/292,

237 filed Aug. 17, 1994, incorporated herein by reference. As shown in FIG. **1**, this scanning device can be provided with a keypad **15** in a manner known in the art, for manually entering the characters of URLs, needed or required.

As shown in FIG. **2**, the second illustrative embodiment of the Internet Scanning System hereof is realized in the form of an interactive web-based television system **16** which comprises an Internet Terminal Unit **17**, a Remote Control Scanning Device **18** and a standard (NTSC or PAL) color television set **19**. As shown, the Internet Terminal Unit **17** is connected to the Internet by way of an ISP **4** and includes means for supporting: (i) a GUI-based Internet browser program such as the Internet Navigator® from Netscape Communications or the Internet Explorer® from Microsoft, Inc.; and (ii) the TCP/IP networking protocol on the Internet. In the preferred embodiment, the Internet Terminal Unit **17** can be realized using any one of a number of commercially available Internet Terminal devices, such as, for example: the Mediamaster 9500™ Internet Terminal from Nokia, Inc.; the NetStation™ Internet Terminal from Acorn Computer; or the "Internet Digital Appliance" from Diba.

As shown in FIG. **2**, the Remote Control Scanning Device **18** of the second illustrative embodiment can be realized by integrating a miniature automatic bar code symbol reading module **20** into the wireless remote control device that is provided with the commercially available terminal unit that is used to practice this embodiment of the present invention. Preferably, automatic bar code symbol reading module **20** is similar to the device described in great detail in Applicant's copending application Ser. No. 08/292,237 supra. Such laser scanning engines, as they are called, are commercially available from Metrologic Instruments, Inc., of Blackwood, N.J., under the tradename ScanQuest®. The manner in which such a laser scanning engine can be integrated into any one of the remote control devices of the above-identified Internet Terminals, and thus provide the Remote Control Scanning Device **18**, will be described below.

The Mediamaster 9500™ Internet Terminal from Nokia, Inc., the NetStation™ Internet Terminal from Acorn Computer, or the Internet Digital Appliance from Diba, are each provide with a wireless remote control device which includes a programmable microcontroller (i.e., microprocessor) operably connected to a system bus of one sort or another. The system subcomponents that are connected to this system bus structure include, for example: program memory realized in the form of EPROM **21**; data storage memory realized in the form of RAM **22**; a keypad **23**, data storage registers and interface circuitry; an IR-based communication circuit and interface circuitry **24**; and a power supply and power distribution circuitry **25**. In such commercial products, no visual display device (e.g., LCD panel) is provided, as all display functions are provided on the television screen using an on-screen display format well known in the art. Integration of an automatic ScanQuest® Laser Scanning Module (Model No. IS4120) into the system architecture of such wireless remote control devices can be achieved by adding additional data registers to the system bus, and connecting the data output port of the scanner to such registers in a conventional manner. Additional control logic will have to be provided by the microcontroller in to provide scan data from the scanner priority over data entered manually into the system. All such modifications are within the ordinary skill in the art.

As shown in FIG. **2**, Remote Control Scanning Device **18** has an optically-transparent scanning plate **9A** supported by an optically transparent extension **9B**. The scanning plate **9A** has formed therein a sighting window (i.e., aperture) **10**, through which a URL-encoded bar code symbol **8** is automatically scanned and read when such a printed symbol (on a substrate) is aligned with the sighting aperture. The IR-based object detection field **11** extends just slightly beyond the sighting window **10** so that the laser scanning beam **12** is automatically initiated only when an object (e.g., Web Guide) **13** is placed up against the sighting window **10**, as when the scanning plate **10** is brought in contact with URL-Encoded Bar Code Symbol **8** associated with a particular Web-site listing, shown in FIG. **2**. During operation, the Remote Control Scanning Device **18** is used to read URL-encoded bar code symbols **8** printed on Web-site GuideBook **13** in order to connect to the corresponding Web-sites thereof.

While any standard (NTSC or PAL) color television set can be used in connection with the Internet Terminal **17** to display graphical and audio information content associated with any particular Web-site accessed by the system, it is preferred that a higher-resolution (VGA or SVGA) computer monitor is used in connection therewith to display high resolution graphics.

As shown in FIG. **3**, the third illustrative embodiment of the Internet Scanning System hereof is realized in the form of a hand-held Scanning Integrated Terminal. The Scanner Integrated Terminal **26** is shown connected to an ISP **4** by way of a radio-base station **27** and wireless link **5**. The hand-held Scanning Integrated Terminal **26** has an integrated GUI-based web browser program, display panel **28**, touch-screen type keypad **29**, and programmed bar code symbol scanner **20**. The function of the bar code symbol scanner **20** is to read a bar code symbol **8** that is encoded with the URL of a Web-site to be accessed by the Internet Scanning System, and produce symbol character data representative thereof.

In the illustrative embodiment, the Scanner Integrated Terminal **26** is realized as a transportable computer, such as the Newton® Model **130** Messagepad **30** from Apple Computer, Inc. of Cupertino, Calif. This device is provided with NetHopper™ brand Internet Access Software from which supports the TCP/IP networking protocol within the Newton MessagePad. The Newton Messagepad is also equipped with a Motorola PCMICA-based modem card **31** having a RF transceiver for establishing a wireless digital communication link with either (i) a cellular base station, or (ii) one or more satellite-base stations (**27**) connected to the Internet by way of an ISP **4** in a manner well known in the global information networking art. While it is understood that, in some instances, it may be desired to connect a pen or wand device to the serial port of the Newton MessagePad to provide bar code symbol reading capabilities thereto, it is generally preferred that automatic laser scanning engine **20** (e.g., Metrologic ScanQuest® Laser Scanning Module Model No. IS4120), be interfaced with the serial communications port of the Newton MessagePad so as to realize the Internet Scanning System of the third illustrative embodiment hereof.

As shown in FIG. **3**, the entire Newton MessagePad, ScanQuest® Laser Scanning Module **20** and auxiliary battery supply (not shown) are completely housed within a rubberized shock-proof housing **32**, in order to provide a hand-supportable unitary device. The rubberized housing is provided with an scanning aperture **10** realized within an optically transparent scanning plate **9B** supported by extension **9A**. The function of the scanning aperture **10** is to allow the projected laser beam **12** to sweep across a URL-encoded bar code symbol **8** located within the sighting window **10** of optically-transparent scanning plate **9B**, once the object (e.g., Web-site guide) **13** is detected by the object detection field **11**.

In each of the three illustrative embodiments described above, the bar code symbol scanner can be replaced by a programmed optical character reader realized using the automatic holographic laser scanning technology disclosed in great detail in Applicant's copending application Ser. No. 08/573,949 filed Dec. 18, 1995, incorporated herein by reference. The function of the programmed optical character reader is to allow the Internet Scanning Terminal to access any desired Web-site by reading the alphanumeric character string comprising the URL thereof, and provide the same as output to the GUI-based Internet browser program thereof. In such alternative embodiments, the function of the optical character reader (i.e., character reading module) is to read the SCII characters comprising the URL **14** printed on a Web-site guide or like publication, avoiding the need for manual key entry operations.

Having described various illustrative embodiments of the Internet Scanning Terminal of the present invention, it is appropriate at this juncture to describe a system and method for composing, transmitting and printing lists (e.g., menus) of URL-encoded bar code symbols in various ways according to the principles of the present invention.

As shown in FIG. **4**, the Web-linked client computer workstation **6** of FIG. **1** has a graphical user interface (GUI) and an Internet browser (or communicator) program that has a plug-in type module (i.e., subprogram) composing, transmitting and printing lists and menus of URL-encoded bar code symbols and information elements associated therewith (hereinafter the "Composition/Printing Module"). Composition/Printing Module can be realized as a plug-in module to the Netscape Navigator browser program, the Microsoft Explorer browser program, or other Internet communication program presently available or developed in the years ahead, using programming techniques and languages (e.g., Java) known in the art. The purpose of this Module is to cooperate with the Internet browser program and support the user during the composition and editing of lists (i.e., menus) of URL-encoded bar code symbols and information fields related thereto in accordance with the principles of the present invention, and then enable such lists and menus to be printed locally using printer **35** shown in FIG. **1**, or transmitted to a remotely located system for printing. As such, the Module is provided with an editing mode to edit information entered into information fields associated with any particular bar code list or menu of the present invention. Composition and printing functionalities and enabling programming code embodied within the Module or browser program of the present invention can be found in Bar Code Pro® brand Bar Code Symbol Composing and Printing software sold by SYNEX, of Brooklyn, N.Y. Optionally, the Module and/or browser program can also embody the functionalities provided by FilePro® bar code database software, also available from SYNEX.

As shown in FIG. **4**, the Composition/Printing Module has an associated "display window" **36** which can be opened in a conventional manner to allow the user to easily compile bar code symbol menus during operation of an Internet browser program. In the illustrative embodiment shown in FIG. **4**, the bar code menu display window **36** is shown to comprise information display fields **36A**, **36D**, **36N** associated with three exemplary information resources on the WWW that have been listed within a bar code menu in composition. As shown, this listing of information display fields graphically present on display monitor **6A**: a set of human-readable URLS corresponding to a set or course of information serving Web-sites schematically represented in FIG. **5**, **36A1**, **36B1**, **36N1**; a set of titles assigned to the URLs (which may be directed to the owner of the site, the information content contained therein, etc.) **36A2**, **36B2**, **36N2**; a set of brief descriptions of content (DOC) served at the Web-sites indicated by reference numerals **36A3**, **36B3**, **36N3**; and date or dates the set of Web-sites were last visited by the composer, indicated by reference numerals **36A4**, **36B4**, **36N4**.

In FIG. **6A**, an information storage structure **37** is shown for storing the information elements associated with a given URL information block in a bar code menu composed using the Composing/Printing Module during on-line Internet surfing sessions or while off-line. As shown, each information storage structure **37** comprises the following information fields for a given information resource: URL Field **37A** for storing information descriptive of the URL of Web-site location (e.g., information resource) associated therewith; URL-Encoded Bar Code field **37B** for storing information descriptive of the URL-Encoded bar code associated with the URL of the information resource; Title Field **37C** for storing information descriptive of the title assigned to the corresponding information resource; Content Description Field **37D** for storing information descriptive of the content of the information resource; and Data Field **37E** for storing information descriptive of the date the composer or his agent last visited the information resource prior to composition of the bar code symbol menu.

In FIG. **6B**, an exemplary section of a printed URL-encoded menu is shown. As shown, each printed block of information **38** associated with a particular Web-site (or Internet information resource) has the following information display fields: an information display field for graphically displaying the corresponding URL, indicated by reference numeral **38A**; an information display field for the URL-encoded bar code symbol, indicated by reference numeral **38B**; an information display field for graphically displaying the Title assigned to Web-site location referenced by the corresponding URL, indicated by reference numeral **38C**; and an information display field for graphically displaying the description of the information content served at the Web-site location referenced by the corresponding URL, indicated by reference numeral **38D**; and an information display field for graphically displaying the date on which the composer or his agent list visited the information resource, indicated by reference numeral **38E**. In general, a number of such information display blocks can be printed on a single sheet of print media (e.g., paper, plastic, etc.) **39**. The particular display layout for information display block will depend on the application at hand and typically will vary from embodiment to embodiment of the present invention. For example, in some embodiments, the printed information display blocks will be arranged in a single column down each printed sheet. In other embodiments, the printed information display blocks will be arranged in a two or more rows or columns. In yet other embodiments, the layout of such information display blocks may be of random or quasi-random structure.

FIGS. **7A** and **7B** set forth a high-level flow chart describing the steps carried out during composition, transmission and printing of URL-encoded bar codes according to the method of the present invention. In the illustrative embodiment, this method is carried out while using a GUI-based Internet browser program (on-line), with the above-described plug-in Module installed therein enabling the user to compose, transmit and print bar code menus of the type schematically illustrated in FIGS. **6A** and **6B**. It is understood, however that the method can also be carried out while the Internet browser program is "off-line".

Alternatively, the functionalities of the module to be described in greater detail below can be realized in a separate program designed to run "in the background" of the operating system while the browser is running, or run by itself when the Internet browser program is not running.

As indicated in Block A of FIG. 7A, the method involves first determining completely or partially, a set or information resources on the Internet (e.g., WWW or FTP Servers) that the composer wishes he or another to visit in the immediate or future. Typically, although not always, the Internet browser program with the installed Composition/Printing Module browser hereof will be up and running during the composition process, generally represented at Blocks A through D in FIG. 7A. This list or ordered set of information sources identified by the composer may be thematically related by a particular subject or topic which the composer may have in mind before, during or after the composition process. The list may be, however, simply a collection of information resources on the WWW, for example, which the composer would like to catalog in the form of a bar code menu so that others may easily visit the cataloged collection of Web-sites by simply reading URL-encoded bar code symbols from a printed menu, as described hereinabove. In the field of education, for example, such bar code menus could be composed by teachers or professors and distributed to their students so that they can visit the catalogued Web-sites either inside or outside the classroom or lecture hall. Writers and/or editors of books, journals and magazines could print URL-encoded bar code symbols in the back of their publications (corresponding to references cited in their published publications). Brochures and manuals for products and/or services could contain lists of URL-encoded bar code symbols that point to information resources on the Internet, which contain information relating to such products and/or services. Printed (i.e., hard-copy) Web-site magazines, catalogues, directories and the like can be formatted with URL-encoded bar code symbols of the present invention, as illustrated in FIG. 1A and described above, to enable Internet access thereto by scanning such encoded bar code symbols.

As indicated at Block B in FIG. 7A, the composer employs the Internet browser program of the present invention to record the URLs for the set of information resources on the WWW. The URLs can be entered into their appropriate information recording fields, consecutively at a particular point in time, or over a period of time when the composer is surfing the WWW and determining which WWW information resources should be catalogued within the menu under composition.

As indicated at Block C, the composer records a number of information items in an information storage file as shown in FIG. 6A and displayed with the Internet browser screen **40** on the computer terminal shown in FIG. 4. For each WWW information resource, the composer is encouraged to enter the following information items: the URL for the WWW information resource; the Title assigned to the WWW information resource by the composer; and the description of the information content at the WWW information resource. Collectively, these related items of information are stored within the information storage structure of the file maintained by the CTP Module and form an information block.

As indicated at Block D in FIG. 7A, after each information block is recorded for a particular WWW information resource, the plug-in Composition/Printing Module is used to automatically generate a URL-encoded bar code symbol information structure therefor and record this information in its respective information field within the information storage structure represented in FIG. 6. Once a list of URLs has been captured and recorded within the information storage structure underlying any particular bar code menu, the composer may then decide during the editing mode of the plug-in Module, exactly how the Web-site information blocks, shown in FIGS. 6B, should be ordered for presentation to his or her audience upon printing.

As indicated in FIG. E of FIG. 7B, a composed bar code symbol menu as shown in FIG. 6B is printed out on a sheet of paper using conventional Postscript® printing equipment **35**, illustrated in FIG. 1, for example. At this stage of the process, the following information items are printed out for each WWW information resource: the URL for the WWW information resource; the URL-encoded bar code symbol; the title assigned to the WWW information resource by the composer; the description of the WWW information resource; and the date on which the composer or his agent last visited the information resource. Expectedly, the display format for any printed information file according to the present invention will vary from embodiment to embodiment. Preferably, the Composition/Printing module installed within the Internet browser program hereof will be provided with a number of different display formats, from which the composer can easily choose to satisfy the requirements of the project and application at hand.

As indicated at Block F, the composer may optionally choose to transport by electronic data transmission or facsimile transmission, any composed bar code symbol menu according to the present invention. In such instances, the compiled information storage file (as shown in FIG. 6A) representing the composed menu can be electronically transmitted to a remote site, by e-mail, facsimile transmission, or other protocol available over the Internet, and thereafter printed out using appropriate print-driver software. This way, the WWW information resources listed in the compiled information structure can be easily visited by reading the corresponding URL-encoded bar code symbols into the Internet browser program using a bar code scanner. Alternatively, the bar code menu can be printed out locally and then transmitted to a remote location by way of facsimile transmission for print out and subsequent use. When using this latter technique, however, careful consideration must be accorded to the resolution of the printed bar codes, as their resolution may be significantly reduced due to scanning facsimile transmission, and printing required by this latter technique. In such instances, it may be desirable to scale-up the bar codes during menu composition to compensate for expected resolution losses downstream.

The bar code menu composition/printing process of the present invention has been described above in connection with a commercially available GUI-based Internet Browser program that has been provided with a plug-in module that enables the menu composition, transmission and printing processes of the present invention. It is understood, however, that in alternative embodiments of the present invention, an independent program may be written to carry out the interactive menu composition/transmission/printing process illustrated in FIGS. 7A and 7B. In such instances, the composition program could be designed to run in the background of the operating system while the composer is using the Internet browser program to explore Cyberspace and determine which Web-sites should be listed in the bar code menu in composition. Once a list of URLs has been captured and recorded within the information storage structure underlying any particular bar code menu, the composer may latter, during the editing mode of the program, decide exactly how the Web-site information blocks, shown in FIG. 6A, should be ordered for presentation to his or her audience upon printing.

Having described the illustrative embodiments of the present invention, several modifications readily come to mind.

Instead of using a laser scanning module to construct the Internet Scanning Terminals of the present invention illustrated in FIGS. **1**, **2** and **3**, one may use CCD-type bar code scanning engines (or modules) employing LEDs to illuminate bar code symbols in the scan field, and CCD-type linear or array devices for capturing images thereof for subsequent decode processing. Examples of CCD scanning modules that can be used to construct CCD-based Internet Scanning Terminals according to the present invention can be found in the following U.S. Pat. Nos.: 5,550,366; 5,354,977; 5,291,009; 5,484,994; 5,349,172; 5,532,467; each being incorporated herein by reference in its entirety.

Also, instead of using encoding 1-D (linear-type) bar code symbols with URL information, as taught herein, one may encode URL information in 2-D bar code symbols as schematically illustrated in FIG. **8**. In such instances, one would provide a 2-D bar code symbol reading engines (or device) within each Internet Scanning Terminal of the present invention to read the URL information encoded within 2-D bar code symbols. Examples of 2-D laser scanning bar code symbol reading devices that can be used to construct "2-D type" Internet Scanning Terminals according to the principles of the present invention are disclosed in the following U.S. Pat. Nos.: 5,594,232; 5,523,552; 5,504,316; 5,414,250; 5,373,148; 5,319,181; each being incorporated herein by reference in its entirety. In other embodiments of the present invention, one may employ scanning modules capable of reading both 1-D and 2-D type bar code symbols.

In order to indicate that a particular printed publication or object bears a URL-encoded bar code symbol according to the present invention, and not a conventional bar code symbol (e.g., UPC Symbol), it may be advantageous to print the entire or primary portion of the encoded URL (e.g., http://www.metrologic.com) about the perimeters of the URL-encoded bar code symbol, in a similar way that UPC numbers are printed below UPC-type bar code symbols. This printing convention, once adopted, will help consumers determine which bar code symbols provide "Internet Access", in contrast with other types of bar code symbols.

In instances where the character string length of the URLs becomes long, particularly in connection with information resources that are stored in very-large Web-based database management systems (DBMS), it may be desirable to encode the URLs (to shorten their character string length) prior to encoding the URL within the bar code symbology being employed.

In the illustrative embodiments, the exemplary information resources have been indicated as being stored within WWW information servers, and thus, the URLs for such information resources have been included in the character substring "http://www." It is understood, however, that URL-encoded bar code symbols according to the present invention may also refer (i.e., point) to information resources stored on any type of Internet information server (e.g., a FTP information server) accessible through an Internet browser or communication program of an Internet Scanning Terminal of the present invention.

Also, in some embodiments of the present invention, it may be desirable to encode the URL of a particular information resource within two or more moderate-length bar code symbols, instead of within a single long-length bar code symbol, thereby allowing the use of shorter length bar code symbols on printed menus and lists.

In such an embodiment illustrated in FIG. **9**, the primary (i.e., base) portion of the URL (e.g., "http://www.metrologic.com") identifying the location of the WWW Server can be encoded within a first bar code symbol, whereas the auxiliary (i.e., extension) portion of the URL (e.g., "/products/MS6720.html") indicating the location of the information resource (web pages) relative to the identified WWW Server can be encoded with a second bar code symbol. Internet Access to such an information resource could then be achieved in a two-step process, namely: (1) scan the first bar code symbol to access the home page of the WWW Server located by "http://www.metrologic.com"; and (2) scan the second bar code symbol to access the information resource located by "Products/MS6720/.html". Preferably, the primary and auxiliary segments of the URL would be printed below the first and second bar code symbols respectively, as shown in FIG. **9**. This composite bar code symbol structure can be used during the menu composition process of the present invention as described in detail hereinabove.

The barcode-driven Internet Scanning Terminal of the present invention can be applied in numerous ways to make life easier at home, in the office, and at school. For example, the present invention can be used to construct a Web-based Routing, Tracking and Delivery System shown in FIGS. **10** through **18** of the drawings.

Overview of the Web-Based Package Routing, Tracking and Delivery (RTD) System Hereof

As shown in FIG. **10**, the web-based package routing, tracking and delivery (RTD) system of illustrative embodiment generally indicated by reference number **50** comprises a plurality of system components, namely: globally-based digital telecommunications network (such as the Internet) **1** providing an infrastructure described hereinabove including ISPs, NSPs, routers, telecommunication lines and channels and the like; one or more data-synchronized Package Routing, Tracking, and Delivery (RTD) Internet Servers **51** connected to the Internet by way of the Internet infrastructure; one or more Package Log-In/Shipping (Computer-Based) Subsystems **52'**, **52"** and **52"'** (generically indicated as **52**), located at different shipping locations throughout the world, and operably connected to the Internet by way of the Internet infrastructure; a plurality of Package Routing (Computer) Subsystems **53'**, **53"**, **53"'** (generically indicated as **53**) located at remote hub stations of the RTD system and connected to the RTD Internet Servers by way of the Internet infrastructure; and a plurality of Portable Package Delivery (PPD) Computer-Based Subsystems (e.g., integrated scanning terminals) **54'**, **54"**, **54"'** (generically indicated as **54**) in wireless digital communication with the RTD Internet Servers by way of the Internet infrastructure. Each of these subsystems will be described in greater detail below. Thereafter, the operation of the RTD system of the present invention will be described.

The Package Log-In/Shipping Computer Subsystem

As shown in FIG. **11**, each Package Log-In/Shipping Subsystem **52** is realized as either a desktop or portable Internet Scanning Terminal of the present invention shown in FIGS. **1**, **2**, or **3** and described above. The function of the Package Log-In/Shipping Subsystem **52** is to log-in each package with a relational database management system (RDBMS) maintained within or behind the RTD Internet Server **51** of the system. As will be described in greater detail hereinafter, this log-in procedure involves: (1) accessing a RTD Internet Server **51** by reading a particular predesignated URL-encoded bar code symbol specifying its address on the Internet; (2) entering package-related infor-

mation into the system by way of the Internet; (3) creating and printing a custom bar code symbol label encoded with the URL (and Zip-Code) and an address label bearing the name and address of the entity to whom the package is to be delivered; and (4) applying the bar code label and address to the package prior to shipping for carrying out routing, tracking and delivery functions.

The RTD Internet Server of the Present Invention

As shown in FIG. **13**, each data-synchronized RTD Internet Server **51** of the illustrative is realized by, for example, a PowerMac 8550/200 Internet Server from Apple Computer, Inc., an Origin 200 Server from Silicon Graphics, Inc., or any other Internet server running: (1) HTTP server software (e.g., Netscape Enterprise Server software from Netscape Communications, Inc., or WebStar® Server software from StarNine, Inc.); (2) Common Gateway Interface (CGI) software (e.g., Tango from Everyware Development Corp.); (3) relational database management system (RDBMS) software (e.g., 4D Version 6.0 from ACI US, Inc.); and (4) website development software (e.g., PageMill from Abode, Inc.) for website design and creation. In a conventional manner, each Internet RTD Server is assigned a unique static IP address and a common domain name on the Internet's Domain Name System.

The RDBMS software (e.g., 4D Version 6.0 from ACI US, Inc.) is used to construct a RDBMS **55** within or at the back-end of each Internet RTD Server **51**. As shown in FIG. **13**B, the RDBMS **51** is used to maintain a hypermedia-type relational database containing package shipping, tracking and delivery related information. As shown in FIG. **13B**, each database record (i.e., RTD information record) maintained for each package logged-into the system comprises a number of information fields, namely: a URL Field **55A**, for storing the URL assigned to each package, at which a static information storage location resides on a web-page on the RTD Internet Server **51**; a Package Identification Field **55B** for storing a unique number assigned to each package being routed, tracked and delivered within the RTD system hereof; a Shipper Identification Number Field **55C** for storing an identifying number assigned to each shipper authorized to ship packages within the RTD system; a Destination Information Field **55D** for storing information describing the (initially, past and currently specified) destination(s) of the package; a Zip Code Information Field **55E** for storing Zip Code information on the package destination; a Package Content Information Field **55F** for storing information regarding the contents of the package; a Delivery Instructions Field **55G** for storing delivery instructions (e.g., including graphical maps, audio-based delivery instructions, etc.) for use in delivering the package to its destination; a Date of Log-In Field **55H** for storing the date the package is logged-in with the system; a Date of Shipping Field **55I** for storing the date the package was shipped (or is expected to be shipped) within the system; a Date of Delivery Field **55J** for storing the date the package was delivered (or is expected to be delivered) to its destination; a Package Location Field **55K** for storing information on the location of the package within the RTD system; a Time/Date of Location Field **55L** for storing information on the time and date of the tracked location of the package within the RTD system; a Shipping Route Field **55M** for storing information specifying the planned route of travel assigned to end logged-in package; and Other Information Fields **55N**, **55O** and **55P** for storing various items of information relating to the package description, shipping, tracking and delivery.

In order that each subsystem **52**, **53** and **54** can connect with RTD Server **51** and access the RTD information record associated with any package logged-in with the system, the following measures are taken: (1) each logged-in package **56** is labelled with a URL-encoded bar code symbol **57** having an information field structure shown in FIG. **12**, as well as a conventional name/address label; and (2) the URL encoded within the bar code symbol is used to specify the location of an information storage field **58** represented on a statically-defined HTML-encoded information field **59** on a web-page stored on the RTD Information Server **51** and served to client subsystems by HTTP Server **60**. The size of each Web-based information storage field **58** is sufficient to store ASCII information describing the unique product identification number assigned to the corresponding product being routed and tracked within the system. The RTD information record in the RDBMS **55** associated with any particular package is linked to the URL by the product identification number stored at the information field specified by the URL. The CGI **61** realized aboard RTD Server **51** (1) translates the product identification number (stored on Web-page **59** at URL **58**) into an SQL-type request for the information elements associated with the corresponding RTD information record stored in the RDBMS **55**, and (2) converts such retrieved information elements into an HTML-encoded web-page conveniently formatted for display on the display screen of the requesting client system **52**, **53** and/or **54**. A Web-page composition program, such as Adobe® PageMill, BBEdit®, or any other HTML editing program, can be used to create HTLM-encoded pages **59** for representing statically-defined information storage locations **58** specified by URLs that are ultimately assigned to package identification numbers used within the RTD system. Such Web-paged based information structures can be accessed: (1) using the Package Log-In/Shipping Computer **52** during and after package log-in, (2) using the PPD Computer **54** during package delivery, and/or (3) using any Internet browser program authorized accessed to information fields within the RDBMS of the RTD Internet Server **51**.

The Package Routing Subsystem of the Present Invention

As shown in FIG. **15**, each hub within the RTD system will typically have a number of Package Routing Subsystems **53** located along a high-speed conveyor belt subsystem. The function of each Package Routing Subsystem is to sort and route packages to collection stations within the hub, from which they are then transported to the next location along a route terminating at the final destination specified for the package. In the U.S. Postal System, and United Parcel Service (UPS) system, the package destination is specified by the ZIP CODE of the destination address. In the illustrative embodiment, each Package Routing Subsystem **53** comprises a number of subcomponents, namely: a Metrologic Holotrak™ laser-scanning holographic bar code symbol reader **53A**, as taught in copending application Ser. No. 08/573,949 filed Dec. 18, 1995, incorporated herein by reference in its entirety; an Internet Scanning Terminal as disclosed in FIGS. **1** and **2** and described in detail above, connected to an ISP within the infrastructure of the Internet, and transmitting package tracking information (e.g., Package Routing Subsystem identification number, and time and date of routing operation, etc.) to the Web-page based information storage location specified by the package's assigned URL; package routing machinery **53B** for routing packages along a conveyor pathway that passes through the Routing Subsystem, and terminates within at a collection station, from which the package will be shipped along a route that eventually terminates at the package's destination address; and a subsystem controller **53C** for controlling the operation of the package routing machinery **53B** in response

to ZIP CODE information produced from the bar code symbol reader **53**A during each package scanning operation.

The Portable Package Delivery (PPD) Subsystem of the Present Invention

As illustrated in FIG. **17**, each PPD subsystem **54** is preferably realized as a transportable device of the type shown in FIG. **13** and described in detail above. The function of each PPD subsystem **54** is to provide wireless access to the RDBMS of the RTD Internet Server **51** during package delivery operations. Using portable Internet Scanning Terminal **54**, the delivery person can automatically connect with the RTD Internet Server Subsystem **51** and access the corresponding RTD information file maintained (within the RDBMS thereof) on any particular package within the system by simply reading the URL-encoded bar code symbol. Such accessible information can include multimedia-type information pertaining to: package content specifications; package shipping information, package delivery instructions (e.g., date, time and location of delivery; shipping and handling terms; audio and/or audio visual messages associated with a particular shipped package; etc. By virtue of the fact that RTD information records are linked with URLs within the RTD Server Subsystem, any information element within a RTD information record can be dynamically changed, updated or deleted while its corresponding package or parcel is in transit through the RTD system. Consequently, shipping instructions (e.g., shipping address, shipping time and date, and recipient) can be dynamically changed after the package has been shipped and is in route to its destination. Such flexibility is prohibited when using preprinted 2-D bar code symbols inherently containing information that is statically-encoded at the time of package log-in/shipment.

Operation of the Web-Based Package RTD System of Present Invention

As indicated at Block A of FIG. **14**, the package log-on/shipping procedure begins by assigning a package identification number (PIN) to the package to be logged-into the RTD system of the present invention. This procedure involves the use of the Package Log-In/Shippping Computer Subsystem **52** illustrated in FIG. **11** and the RTD Internet Server Subsystem **51** shown in FIG. **13**. The request for a new package identification number is transmitted from the Package Log-In/Shipping Computer **52** to the RTD Internet Server **51** using electronic forms sent by way of HTTP well known in the Internet art. Then at Block B, the Package Log-in/Shipping Computer **52** is used to send the identified destination ZIP CODE for the package to the RTD Server **51**. At Block C, the RTD Server assigns the package (and thus the package identification number) a unique HTML-encoded information storage location on a web-page of the RTD Internet Server and then links the URL of this information storage location with the package identification number. Then at Block D, the Package Log-In/Shipping Computer **52** encodes the URL and the ZIP CODE (associated with the package identification number) within a bar code symbol information structure of either 1-D or 2-D bar code symbology, and then prints out the bar code symbol on a label. Then at Block E, the printed bar code label is applied to the package, and thereafter the Package Log-In/shipping Computer **52** transmits a confirmation request to the RTD Internet Server **51** confirming entry of the package identification number, Zip Code and URL assigned thereto into the RDBMS of the System. As indicated at Block F, upon receiving confirmation from the RTD Internet Server **51** that such information elements are recorded in the RDBMS, the labelled package is released for shipment to its destination by way of a shipping route available within the RTD system. The above procedure is repeated for each and every package that is to be shipped using the system.

As each package is transported through the RTD system, it is moved through one or more Package Routing Subsystems, as shown in FIG. **15**. As each package is scanned by the bar code symbol reader **53**A at a Package Routing Subsystem, a package routing/tracking procedure is automatically carried out. This procedure is outline in the flow chart of FIG. **16** described below.

As indicated at Block A of FIG. **16**, the bar code scanner at the Package Routing Subsystem reads the URL/ZIP Code encoded bar code symbol on the package and obtains the information representative of the URL and the Zip Code. Then, at Block B, the Package Routing Subsystem uses the locally-recovered Zip Code to route the package at the Package Routing Subsystem at the hub station of the system. Then at Block C, the Routing Subsystem uses the obtained URL to access the RTD Internet Server by way of HTTP and update the location of the scanned package within the RDBMS of the system. Each time the package is scanned at a different Package Routing Subsystem, or other Internet Scanning Terminal located within the RTD system, the current location of the scanned package within the System is updated, by ensuring that each HTTP request sent to the RTD Internet Server (by the Package Routing Subsystem) includes information identifying the requesting Package Routing Subsystem.

When the package finally arrives at the hub nearest its destination, it typically is loaded upon a truck or like vehicle for delivery. Then it is delivered to its destination according to the delivery procedure described generally in the flow chart of FIG. **18** and described below.

As indicated at Block A of FIG. **18**, the delivery person uses the Portable Delivery Computer **54** hereof to read the URL/ZIP-CODE encoded label on the package in order to recover the URL encoded therein. The Portable Delivery Computer can be mounted within the delivery vehicle or held in the hand of the delivery person. As indicated at Block B, the Portable Delivery Computer automatically connects to the RTD Internet Server **51** by way of HTTP using the locally recovered URL encoded in the scanned bar code symbol. As indicated at Block C, the information elements shown in FIG. **13**B, that are associated with the RDBMS information record linked to the URL, are automatically displayed on the display screen of the Package Delivery Computer **53**. Such information, particularly the package delivery instructions, are then used to deliver the package to its destination. Such information can be of a multimedia nature, including audio instructions and graphical images of delivery maps to facilitate the delivery process.

In the illustrative embodiment of the RTD system described above, packages being shipped within the system have been labelled with bar code symbols that have been encoded with both URL and ZIP-CODE information. The reason that ZIP CODE information is encoded in the bar code symbol (along with the URL) is that the ZIP CODE can be locally recovered very quickly at a Package Routing Subsystem **53** and used to route packages moving along the conveyor belt system at high speeds. Alternatively, however, the locally recovered URL can be used to connect to the RTD Internet Server **51**, access its RDBMS, and acquire the ZIP CODE of any particular package that has been scanned by the Package Routing Subsystem. However, as the time required to access such information from the RTD Internet Server **51** typically will be greater than the residency time of the package moving through the Package Routing

Subsystem, it will be desirable in many instances to use a locally recovered ZIP CODE to carry out package routing operations described hereinabove.

In an alternative embodiment of the present invention, the URL and the ZIP CODE can be encoded in separate bar code symbol information structures, as indicated in FIG. 12B. The bar code symbols of this composite information structure can be placed side by side, stacked above and below one another, or randomly on the surface(s) of the package.

In either of the illustrative embodiments of the RTD system described, an improved method of globally routing, tracking and delivering packages, parcels and objects alike is provided. At the same time, this system avoids the shortcomings and drawbacks associated with the use of statically-encoded 2-D bar code symbols and prior art integrated scanning terminals for reading the same. Unlike 2-D bar code symbols, the RTD system of the present invention can be used to provide multi-media instructions to delivery personnel to improve package delivery operations worldwide. Also, audio-visual messages, linked to a particular package, can be stored on the RTD Internet Server **51** by the sender of the package and delivered to the package Recipient at the time of delivery, to provide a "singing or voice telegram" type message along with the package. The point of delivery message can also provide images and short video clips for visual display to enhance the package delivery process in ways unattainable using prior art delivery techniques. Optionally, such multi-media messages can be downloaded from the Portable Package Delivery Subsystem **54** onto an information storage device (e.g., floppy disc, ZIP® storage device from Iomega, Inc., etc.) and delivered with an accompanying parcel at the point of delivery.

The RTD System of the present invention can be modified to provide a web-based Document Tracking and Delivery System for use within various types of organizations. In such an alternative embodiment of the present invention, a Document Log-In Computer Subsystem, similar to the Subsystems of FIG. **11**, would be used to log-in documents with the System. There would be no need for a Package Routing Subsystem, as employed in the system of FIG. **10**, nor the use of URL/ZIP-CODE encoded bar code symbols. Rather, URL-encoded bar code symbols of the type shown in FIGS. **8** or **9** would be placed on documents being tracked within the system. Also, a web-based Document Tracking and Delivery Server, similar to the RTD Server of FIG. **13**, would be used to store document tracking and delivery information, as well as information (including e-mail messages sent to others within the organization) pertaining to the document as it is received by others within the system. An advantage of such a system would be that hard-copy documents can be circulated within an organization, and those wishing to comment on them can quickly access the Document Tracking/Delivery Server by reading the printer URL-Encoded bar code symbol on it, in order to append messages and notes to the database records associated with the document, and allow others along the review chain to follow all that has occurred. Documents to be tracked within the system can be physical specimens, drawings, 3-D articles, letters, memos, photographs and the like.

The Internet Scanning Terminals, Bar Code Menu Composition Subsystem, and Package RTD system and the like may be modified, in a variety of ways, to carry diverse range of functions relating to various aspects of the present invention. All modifications and variations of the illustrative embodiments are deemed to be within the scope and spirit of the present invention as defined by the accompanying Claims to Invention.

What is claimed:

1. A system for routing, tracking and delivering packages from a shipping point to a plurality of destination points, comprising:

a RTD Internet Server connected to the Internet infrastructure including a relational database management system (RDMS) for storing package delivery information and package tracking information on each package logged-in with said system;

a Package Log-In/Shipping Computer Subsystem located at a shipping location and connectable to said RTD Internet Server by way of the Internet infrastructure, for entering package delivery information and package tracking information on each package logged-in with said system, and producing a URL/ZIP-CODE encoded bar code symbol for application to each said package being logged-in with said system;

a plurality of Package Routing Subsystems located at remote hub stations and connectable to said RTD Internet Server by way of the Internet infrastructure, for scanning URL/ZIP-CODE encoded bar code symbols applied to said packages, transmitting tracking information on said package to said RTD Internet Server, and routing said packages within said system; and

a plurality of Package Delivery Computer Subsystems connectable to said RTD Internet Server, for accessing package delivery information served therefrom.

2. The system of claim **1**, wherein said RTD Internet Server further comprises:

an HTTP Server for serving HTML-encoded web-pages having URL-specified information storage fields represented therein, each said URL-specified information storage field being linked to one said package logged-in with said system; and

a Common Gateway Interface (CGI) for interfacing said RDBMS with said HTTP Server.

3. The system of claim **1**, wherein said RDBMS contains information elements that are related to an information storage location in an HTML-encoded web-page which is specified by a Uniform Resource Locator (URL) that has been uniquely assigned to a particular package being tracked within said system.

4. The system of claim **1**, wherein said Package Log-In/Shipping Computer Subsystem comprises a desktop computer system and bar code symbol printer.

5. The system of claim **1**, wherein said Package Routing Subsystem is a portable scanning terminal programmed to automatically connect to said RTD Internet Server upon reading a URL/ZIP-CODE encoded bar code symbol.

6. A method of routing, tracking and delivering packages from a shipping point to a plurality of destination points, comprising the steps of:

(a) applying a URL/ZIP-CODE encoded bar code symbol to each said package being tracked within said system;

(b) reading said URL/ZIP-CODE encoded bar code symbol on each said package at different locations within said system in order to track the position of said package therein and facilitate routing operations;

(c) reading said URL/ZIP-CODE encoded bar code symbol on each said package in order to access delivery information from an Internet Server, for delivering said package to its destination, and

(d) storing package delivery and tracking information on each package logged in.

7. A system for tracking objects and linking information thereto, said system comprising:

an Internet Information Server connected to the Internet infrastructure including a relational database management system (RDBMS), for storing object tracking information on each package logged-in within said system;

a plurality of Client Computer Subsystems connectable to said Internet Server by way of the Internet infrastructure, for entering into said Internet Information Server and accessing therefrom information on each package logged-in with said system; and

a Log-In Computer Subsystem for entering package identifying information into the Internet Information Server in order to log-in each package to be tracked within said system, and producing a printed URL encoded bar code symbol for application to each said package being logged-in within said system.

8. The system of claim **7**, wherein said Internet Information Server further comprises:

an HTTP Server for serving HTML-encoded web-pages having URL-specified information storage fields represented therein, each said URL-specified information storage field being linked to one said object logged-in with said system; and

means for interfacing said RDBMS with said HTTP Server.

9. The system of claim **8**, wherein said RDBMS contains information elements that are related to an information storage location in an HTML-encoded web-page which is specified by a Uniform Resource Locator (URL) that has been uniquely assigned to a particular object being tracked within said system.

10. The system of claim **7**, wherein said Log-In Computer Subsystem comprises a desktop computer system and bar code symbol printer.

* * * * *

US005288976A

United States Patent [19]

Citron et al.

[11] Patent Number: 5,288,976

[45] Date of Patent: Feb. 22, 1994

[54] **BAR CODE USE IN INFORMATION, TRANSACTIONAL AND OTHER SYSTEM AND SERVICE APPLICATIONS**

[75] Inventors: **Howard Citron**, Katonah, N.Y.; **Robert Springer**, Wyckoff, N.J.

[73] Assignee: **Nynex Corporation**, New York, N.Y.

[21] Appl. No.: **729,648**

[22] Filed: **Jul. 15, 1991**

[51] **Int. Cl.**[5] **G06F 15/20**; G06K 19/06

[52] **U.S. Cl.** **235/375**; 235/462; 235/494; 379/102

[58] **Field of Search** 235/375, 462, 494; 340/825.1, 825.29, 825.35; 379/102, 105, 93

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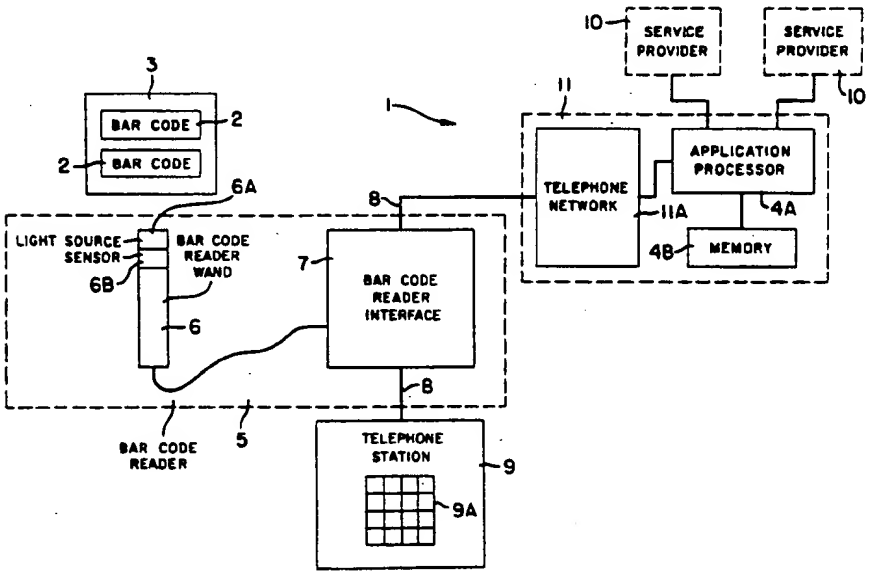
Primary Examiner—Donald Hajec
Assistant Examiner—Esther Chin
Attorney, Agent, or Firm—Loren Swingle; John J. Torrente

[57] **ABSTRACT**

A system which utilizes a bar code having an instruction field whose data specifies an action to be performed and also having a reference field whose data relates to the data in the instruction field. The system reads the instruction and reference fields of the bar code and processess the read data. This processing may determine from the instruction field data that the action or actions to be taken are to be taken on data other than that in the reference field of the bar code. It also may determine from the data in the instruction field that an action to be taken on the data in the reference field is other than an action identified in the instruction field of the bar code. Based on these determinations, the system continues the processing using the appropriate action and data.

A unique bar is also used in the system. This bar code, between its start and stop fields, has a separator field whose width is greater than that of any of the individual bar code characters.

38 Claims, 5 Drawing Sheets



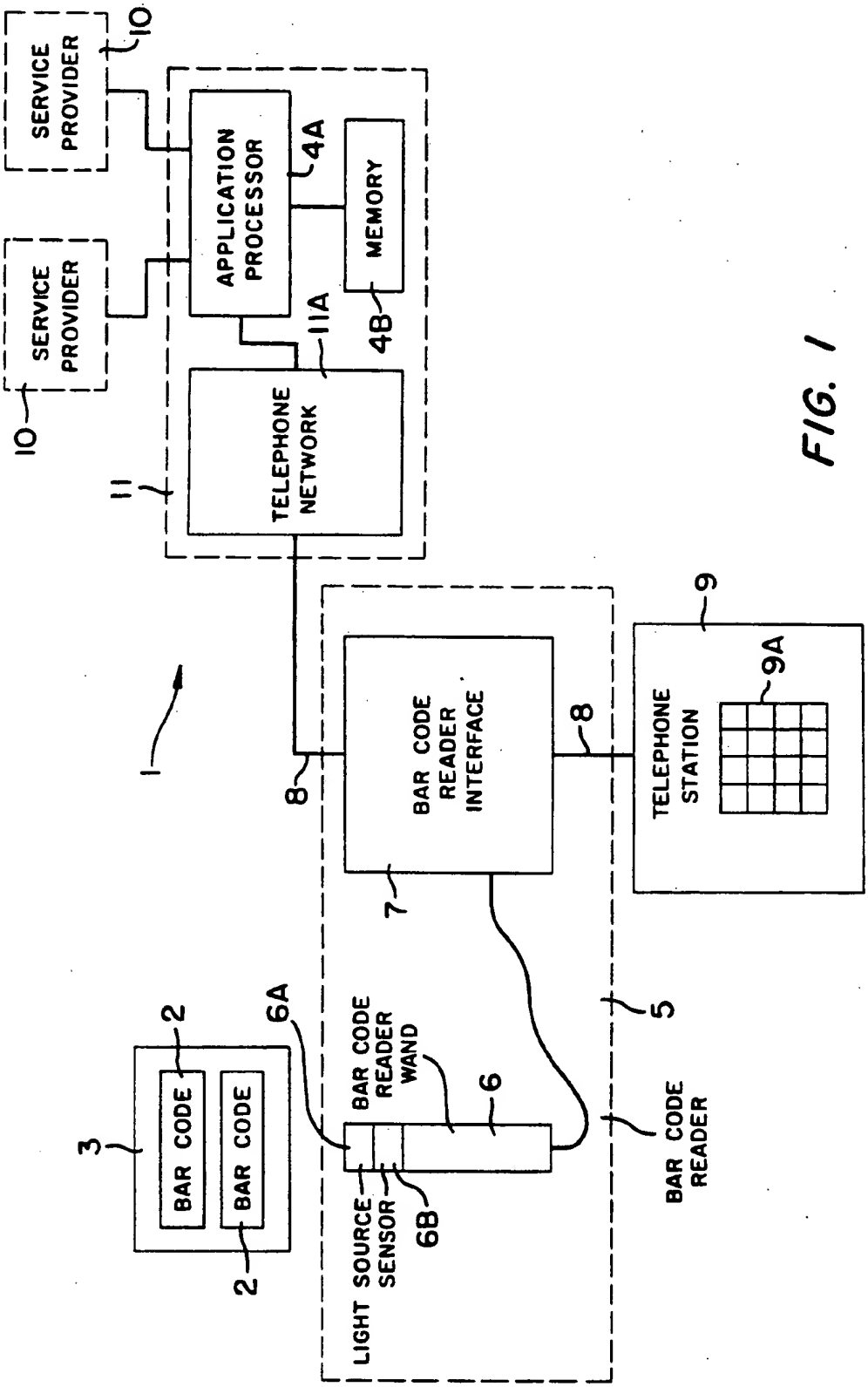

SERVICE PROVIDER
10
SERVICE PROVIDER
10
APPLICATION PROCESSOR
4A
MEMORY
4B
11A
TELEPHONE NETWORK
11
1
8
BAR CODE READER INTERFACE
8
TELEPHONE STATION
9
9A
7
5
6A
2
BAR CODE
BAR CODE
2
3
BAR CODE READER WAND
6
BAR CODE READER
LIGHT SOURCE
SENSOR
6B

FIG. 1

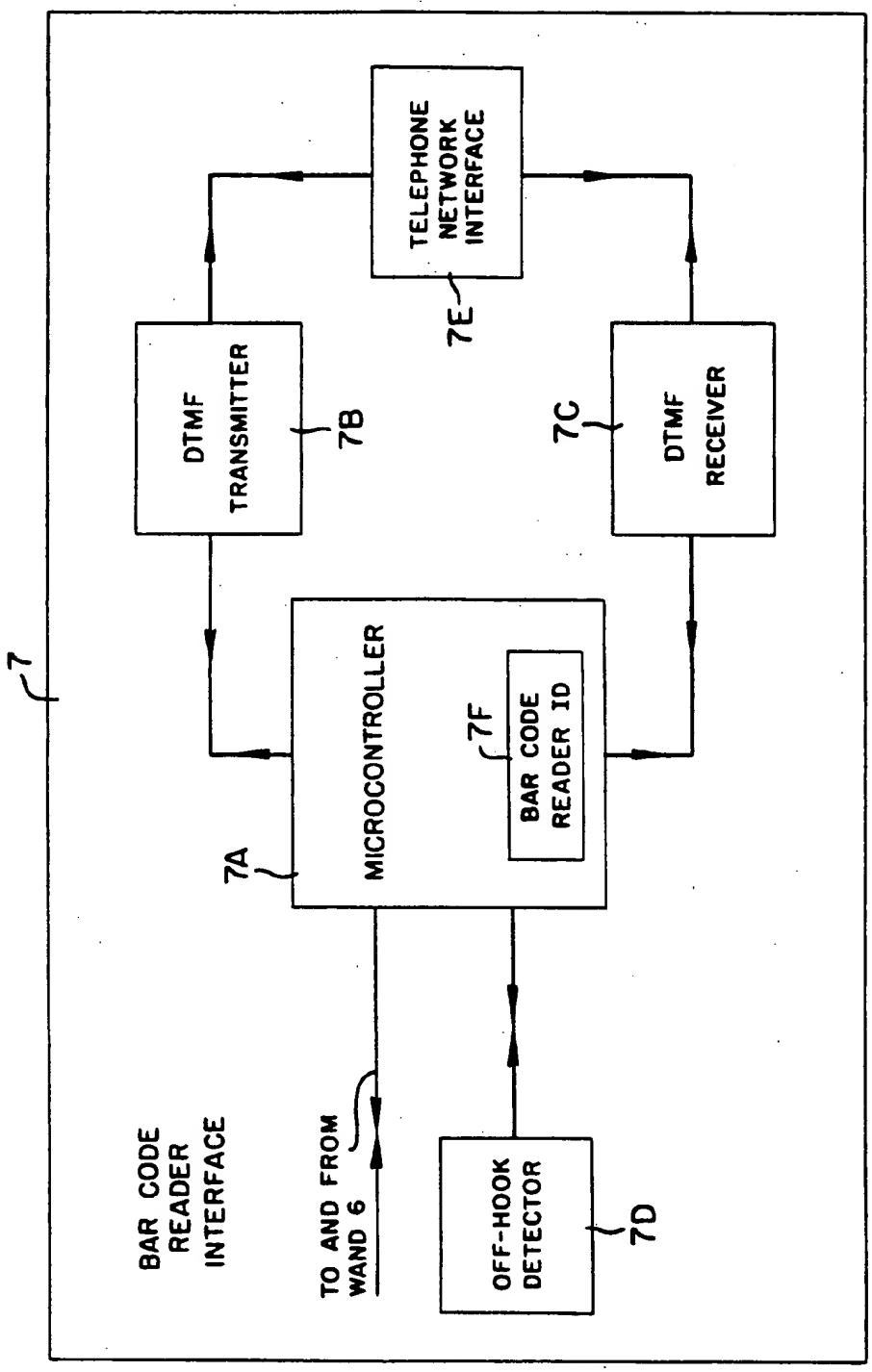

7
TELEPHONE NETWORK INTERFACE
7E
DTMF TRANSMITTER
7B
DTMF RECEIVER
7C
MICROCONTROLLER
7A
BAR CODE READER ID
7F
BAR CODE READER INTERFACE
TO AND FROM WAND 6
OFF-HOOK DETECTOR
7D

FIG. 2

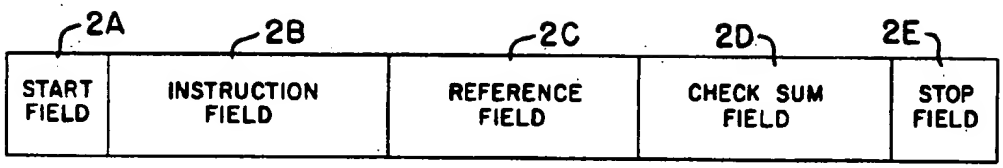


FIG. 3

ACTION	INSTRUCTION FIELD CODES	DTMF TONES
PLAY MESSAGE	$CODE_1$	$DTMF_1$
RECORD MESSAGE	$CODE_2$	$DTMF_2$
STOP / START MESSAGE	$CODE_3$	$DTMF_3$
APPEND MESSAGE	$CODE_4$	$DTMF_4$
ERASE MESSAGE	$CODE_5$	$DTMF_5$
RECORD IF EMPTY OR PLAY	$CODE_6$	$DTMF_6$
$FUNC_1$	$CODE_7$	$DTMF_7$
$FUNC_2$	$CODE_8$	$DTMF_8$
⋮	⋮	⋮
$FUNC_n$	$CODE_{n+8}$	$DTMF_{n+8}$
COM_1	$CODE_{n+9}$	$DTMF_{n+9}$
COM_2	$CODE_{n+10}$	$DTMF_{n+10}$
⋮	⋮	⋮
COM_m	$CODE_{m+n+9}$	$DTMF_{n+m+10}$

FIG. 4

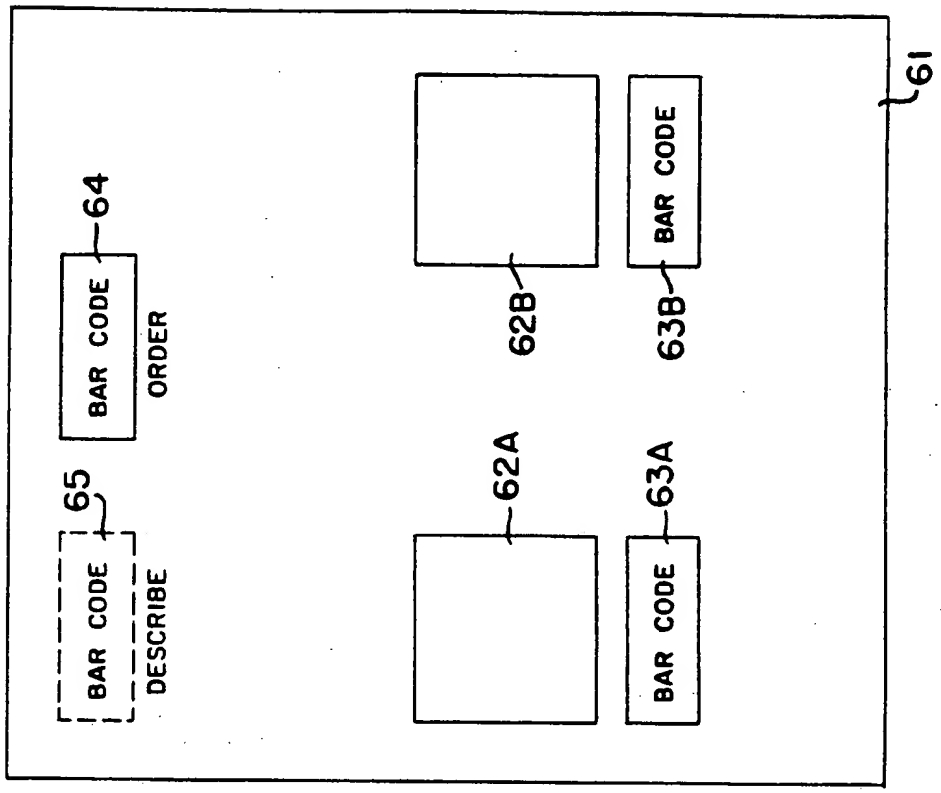

61
64
BAR CODE
ORDER
65
BAR CODE
DESCRIBE
62A
63A
BAR CODE
62B
63B
BAR CODE

FIG. 6

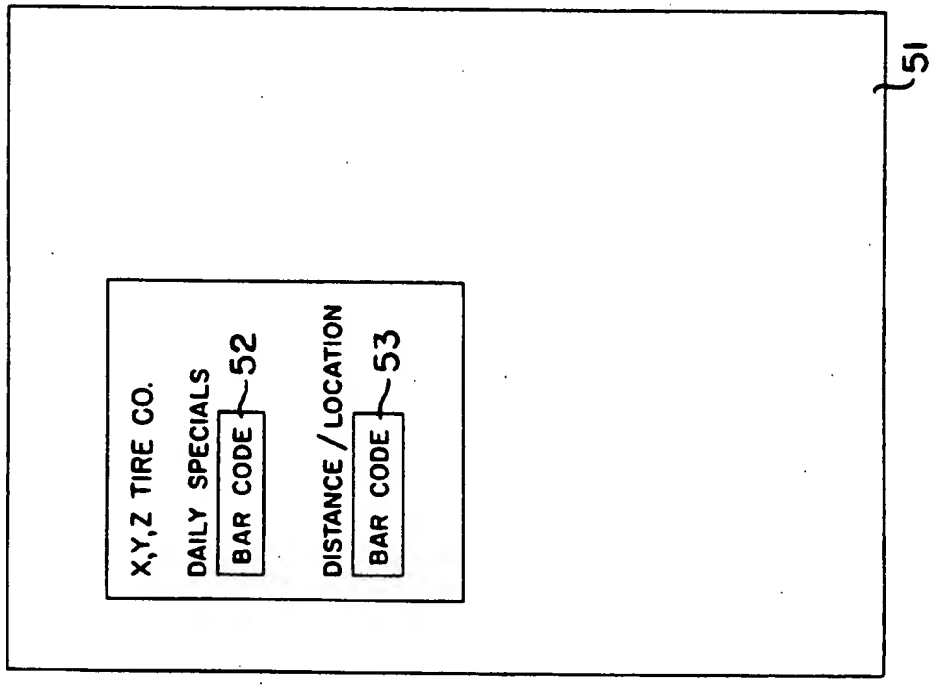

51
X,Y,Z TIRE CO.
DAILY SPECIALS
BAR CODE
52
DISTANCE / LOCATION
BAR CODE
53

FIG. 5

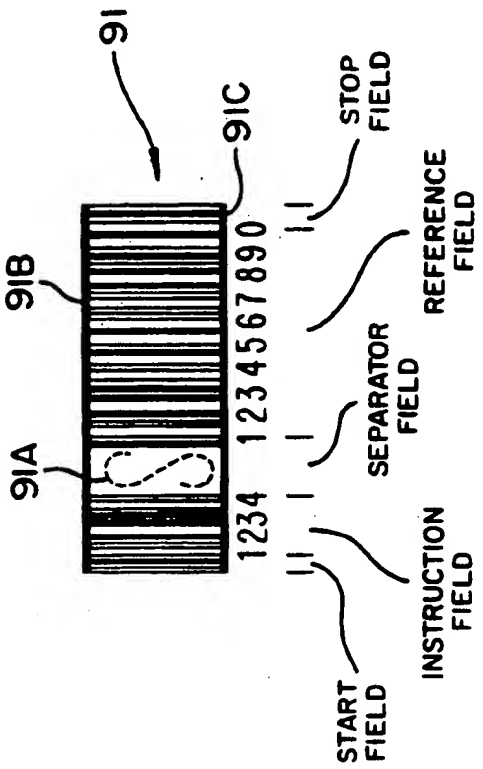


FIG. 8

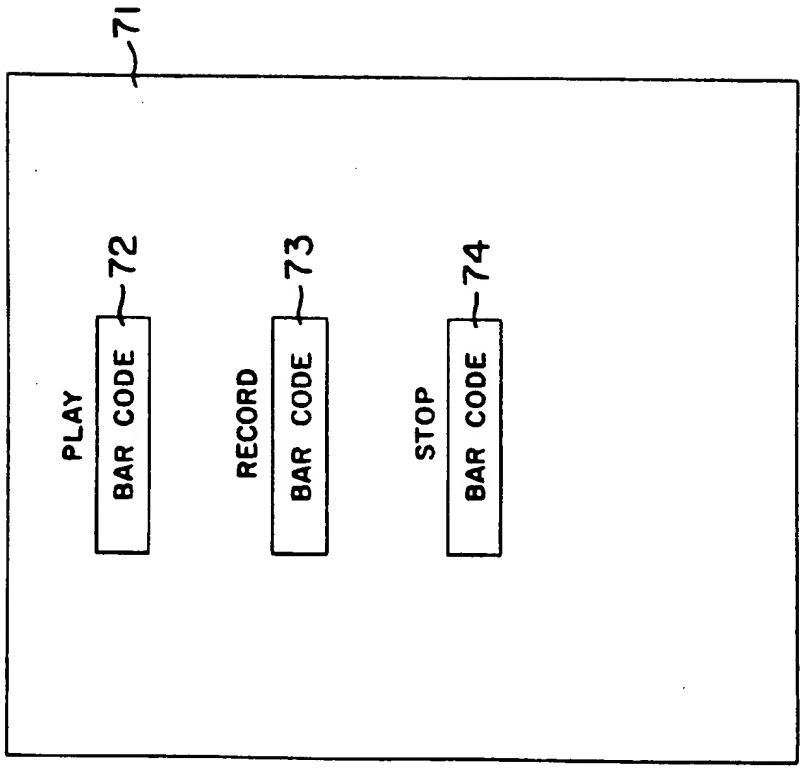


FIG. 7

10/31/2003, EAST Version: 1.4.1

BAR CODE USE IN INFORMATION, TRANSACTIONAL AND OTHER SYSTEM AND SERVICE APPLICATIONS

BACKGROUND OF THE INVENTION

This invention relates to information, transactional and other like system and service applications and, in particular, to system and service applications in which bar codes are used.

There are a variety of systems in use today in which bar codes serve as a way of inputting identification information to the system. Thus, for example, in store checkout systems, bar codes placed on the products being sold are scanned to identify the products. This identification information is then passed to a host processor which determines the prices of the scanned products and reports them to an electronic cash register at the store check out.

Another type of system in which bar codes are used for identification purposes is the lottery communication system disclosed in U.S. Pat. No. 4,937,853. In the system of this patent, bar codes are used to identify lottery ticket numbers, invoices numbers, telephone numbers and the like in connection with services provided to a lottery agent. The identified numbers developed by the agent scanning the bar codes are communicated over an interactive telephone network which connects the agent to a host processor. The host processor provides services such as ticket validation, ordering of materials and invoice confirmation.

In the '853 system, voice prompts are provided over a telephone to the lottery agent who can respond by scanning the bar code of any needed numbers. The electrical signals which result from scanning the bar code are then converted into dual tone multi-frequency (DTMF) signals and/or dial pulse signals by execution of an application program which is accessed by a processor at the bar code reader. These signals are then transmitted over the telephone system to the host processor. When a bar code used to identify a telephone number is scanned, the telephone number is retrieved and supplied to an auto dialer which dials the number in DTMF tones or dial pulses.

The '853 patent further mentions that by accessing keys on a bar code interface, data such as a stored telephone number can be retrieved. The retrieved data can then converted to DTMF tones or dial pulses for transmission over the telephone network.

Another system which uses bar codes for identification purposes and for function command purposes is the home ordering system disclosed in U.S. Pat. No. 4,654,482. In this system, orders can be placed from the home over the direct dial telephone network. The orders are placed from printed materials such as catalogues, newspaper inserts or the like advertising materials which carry an item identification bar code adjacent the description of each item. This bar code when scanned is fed to a processing device at the user's location. The user's processing device stores the identification data contained in the scanned bar code along with transactional information of the corresponding merchant.

The user's processing device in the U.S. Pat. No. 4,654,482 system is operated by the user depressing switches to invoke desired actions (e.g., send, select) or to provide desired responses (e.g., yes, no, etc.) in response to prompts on a display. These prompts are generated at the user's processing device based on signals developed locally at the device or based on signals developed at a merchant's host processor. The latter processor communicates with the user's processing device over the direct dial telephone netw rk via a modem. The user's processing device responds t the button actuation by performing certain activities associated therewith. The U.S. Pat. No. 4,654,482 also states that the switches of the user's processing device may be replaced by a plurality of bar code indicia such that each set or group of such indicia corresponds to a function to be enabled by the replaced switch.

In order to make purchases from different merchants using the U.S. Pat. No. 4,654,482 system, cartridges storing transactional information of the different merchants are provided. As an alternative to using different storage cartridges, the patent states that a fixed memory containing all the data for the different merchants can be used. In this case, one or more bar codes can serve to identify the different merchants and, if desired, to provide data associated with the merchants.

A further system which utilizes bar codes for identifying and extracting data is disclosed in U.S. Pat. No. 4,882,475. In the system of this patent, information associated with a food order is stored based upon an order identification number. The latter number is then placed on an order label via encoding the number on a bar code. By then scanning the bar code, the order number is retrieved and the stored information associated with the order number can then be read out. The patent teaches that this information can be read out verbally or electronically into a hand held data unit.

Bar codes are also used in the synthesized voice generating system disclosed in U.S. Pat. No. 4,964,167. In this system, a bar code carries phonetic information, rhythm information and particular processing information associated with a word which is to be verbally reproduced. By scanning the bar code, this information can be retrieved and used to reproduce the word. The patent teaches developing learning devices in the form of books in which bar codes are placed adjacent words whose pronunciation is to be learned.

While all of the above systems teach the use of bar codes in informational and transactional types of service applications and systems, individual bar codes have been used in these systems for either article identification purposes or function identification purposes. This limited use of the bar codes has limited the versatility of the systems.

It is, therefore, an object of the present invention to provide bar codes and an associated system in which a bar code can serve more than a single purpose.

SUMMARY OF THE INVENTION

In accordance with the principles of the present invention, the above and other objectives are realized in a system in which bar codes are used which have at least a first (instruction) field and at least a second (reference) field. The instruction field of each bar contains data or information concerning or related to action to be taken and the reference field contains data or information related to the data in the instruction field.

The data in the instruction field may specify a particular action or identify a set of actions to be taken. The data in the reference field may identify what the specified action or actions are to be taken on. The instruction field data may also indicate that an action is to be taken

on what is identified in the reference field of another bar code. In such case, the data in the reference field will provide a predetermined indication such as, one or more preselected characters, a null or an empty condition, indicating or confirming that the action is to be taken based on data to be obtained from the reference field of another bar code. If the other bar code is one to be subsequently scanned, the action specified in the subsequently scanned bar code will be disregarded in favor of the action specified the first bar code.

The data in the instruction field may also a provide a predetermined indication such as one or more preselected characters, a null or an empty condition, indicating that an action to be taken on the data in the reference field is an action identified in another bar code. In such case, subsequent scanning of the other bar code will result in the action specified in the subsequent bar code being performed on what is identified by the data in reference field of the first bar code.

In accord with the invention, the action in the instruction field may be a command to perform a function, such as play, related to a message, such as a voice message. In such case, the reference field may identify a storage location where the message is to be retrieved from or stored.

The system of the invention utilizes uniquely identified bar code readers each of which is connected to a centralized application processor. In the illustrative case to be disclosed hereinafter, each reader includes an interface for connecting the reader and an associated telephone to a telephone network. The telephone network, in turn, provides access to the centralized application processor which is adapted to interact with and interpret the instruction and reference fields of read bar codes and to provide one or more services to the users of the system.

Upon scanning of a bar code by the bar code reader, the data in the instruction and reference fields of the scanned bar code is retrieved and separated. If the instruction field data indicates a dial action, the reader will dial the number indicated by the data in the reference field. If the instruction field data indicates other than a dial action, the separated data is then transmitted by the bar code reader over the telephone network, as DTMF tones or other signals, to the application processor. The application processor then interprets the received data and reacts accordingly. If the instruction field of a bar code specifies an action and the reference field identifies data to be acted on, the application processor causes the specified action to be performed using the related identified data. On the other hand, if either field is empty or a null, the application processor will look to the needed data elsewhere as, for example, in a field of a previously or subsequently scanned bar code, to cause on action to be performed. The application processor can be further adapted such that a different number of scans over the same bar code will be interpreted as requiring different actions to be performed.

In yet a further aspect of the invention, the bar codes of the invention are adapted to be organized so as to be visibly distinguishable from standard bar codes. In accordance with invention, this adaption takes the form of a pronounced separator field situated between the start and stop fields of the bar code and comprised of a region whose width is greater than the width of any of the individual bar code characters or elements.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other features and aspects of the present invention will become more apparent upon reading the following detailed description in conjunction with the accompanying drawings, in which:

FIG. 1 shows a system and bar codes in accordance with the principles of the present invention;

FIG. 2 shows a block diagram of the bar code reader of the system of FIG. 1;

FIG. 3 illustrates in pictorial form a bar code in accordance with the principles of the present invention;

FIG. 4 shows a table of actions identifiable in the instruction field of the bar code of FIG. 3;

FIG. 5 shows application of the bar codes of the invention in providing an information and advertising service;

FIG. 6 shows application of the bar codes of the invention in providing an information and ordering service for products;

FIG. 7 illustrates application of the bar codes of the invention in performing a voice message service; and

FIG. 8 shows a unique bar code configuration for the bar codes of the invention.

DETAILED DESCRIPTION

FIG. 1 shows a system 1 using bar codes 2 configured in accordance with the principles of the present invention. Each bar code 2 is carried on an article 3 whose nature will depend upon the nature of the services to be provided by the system. As shown, these services are effected by a centralized application processor 4A having a memory 4B.

The application processor 4A may be part of a telephone system 11 which provides the application processor 4A as a feature of the system. In particular, the application processor enables subscribers to access the services of one or more service providers 10 whose service information is included and supplied to the application processor. The application processor might also be included as part of individual service providers, instead of as a centralized unit.

In the present illustrative case of a centralized unit, the application processor 4A may provide any number of information, transactional or other services. For example, the application processor may provide advertisement and ordering services, voice mail services, tracking and other services. These services may be interactive, i.e., require responses by the user of the system.

In the case of product advertising and order services, the article 3 might be a sales brochure, a catalogue, a newspaper, the yellow pages or like publications. In the case of voice mail services, the article 3 might be a simple sheet of paper with identification titles for reading voice messages into and out of the memory 4B of the application processor.

A bar code reader 5 is provided for reading the information or data contained in the bar codes 2. The reader 5, in the case shown, is identifiable in the system 1 by a unique identification number or ID. This ID is assigned to the reader in an initialization procedure during which the reader is granted access to the system. In this procedure, data associated with the user of the reader is stored in the memory 4B of the application processor 4A along with the reader ID. This data might include, the user's name, address, phone number, credit card number, calling card number, a language preference

and a personal identification number (PIN) to be used for security purposes.

As shown, the reader 5 comprises a wand 6 which contains a light source 6A and a sensor 6B for scanning and sensing each bar code 2. The reader 5 also comprises an interface unit 7 which analyzes the sensed bar code signals read by the wand 6.

The interface unit 7 is connected to a telephone line 8 to which is also connected a telephone station 9. The station 9 is shown as a tone type telephone having a tone keypad 9A for developing DTMF tones associated with specific keys actuated on the pad.

The interface unit 7 can be connected serially with or bridged across the telephone line 8 with the station 9. In the case shown, the station 9 and interface 7 are series connected so that voice and tone signals from the station are coupled through the interface to the line 8. The line 8, in turn, couples the signals to a telephone network 11A of the telephone system 11 to which the application processor 4A is also connected.

As shown in FIG. 2, the interface 7 also includes a microcontroller 7A which controls operation of the interface through interaction with a DTMF transmitter 7B, a DTMF receiver 7C, the wand 6, an off-hook detector 7D and a telephone network interface 7E. More particularly, the microcontroller 7A monitors the off-hook condition of the telephone station 9 via the detector 7D and, when an off-hook status is detected, is able to accept signals from the wand 6. It should be noted that, if desired, the microcontroller itself can count the time between communications to determine an off-hook condition. In such case, the detector 7D need not be employed.

Once an off-hook condition is detected, if the wand 6 is now scanned over a bar code 2, the light from the light source 6A reflected from the bar code 2 is received by the sensor 6B of the wand. The sensor 6B then generates electrical signals indicative of the reflected light and thus the data carried by the bar code. These electrical signals are delivered to the microcontroller 7A. The microcontroller then separates the data in the bar code signals and analyzes the separated data.

Unless the data indicates otherwise, the microcontroller 7A will then dial the telephone number of the application processor 4B by causing the DTMF transmitter 7B to transmit to the telephone network interface 7E the DTMF tones associated with the application processor's telephone number. Thus, the interface upon scanning of the bar code 2 acts initially as an auto-dialer for the off-hook telephone station by dialing the application processor.

Upon the application processor 4A answering the call, the telephone station 9 and interface 7 will be connected over a voice path through the line 8 and telephone network 11A to the application processor. To verify this connection, the application processor can echo in DTMF tones a connection code which is received at the interface 7 by the network interface 7E and DTMF receiver 7C for verification at the microcontroller 7A.

Having established connection to the application processor 4A, the microcontroller 7A then transmits the reader ID stored in the memory 7F of the microcontroller, via DTMF tones, which are received at the application processor. The application processor then, using the received reader ID tones, verifies that the reader is a valid reader of the system. This is reported to the reader 5 by the application processor 4A echoing a verification code to the reader.

The reader 5, thereupon, causes the separated bar code data to be transmitted to the application processor 4A also via DTMF tones generated by the DTMF tone transmitter 7B. The application processor 4A, after checking and confirming parity of the data, acknowledges valid receipt of the data by echoing the received tones to the reader. If parity is not confirmed, the application processor 4A may request a resend of the data.

In accordance with the principles of the present invention, the bar code data included in each of the bar codes 2 hand received by the application processor 4A contains information regarding an action or actions to be taken as well as related information. As a result, the versatility of the system 1 and the ability of the application processor 4A to provide services to the users of the system is greatly improved.

More particularly, FIG. 3 shows a pictorial representation of a bar code 2. As shown, the bar code includes a plurality of fields, illustrated, as fields 2A . . . 2E, at least one of which, i.e., the instruction field 2B, contains data or information concerning or related to an action or actions to be taken, and at least a second one of which, i.e., the reference infield 2C, contains data related to the data in the instruction field. In the present illustrative case, bar code 2 also includes a start field 2A and a stop field 2E which indicate the beginning and end of the bar code, respectively, and a checksum field 2D which is used verify the correctness of the bar code when decoded.

More particularly, the value of the checksum field 2D is determined when the bar code 2 is created usually by an algorithm performed on the characters of the code. When the code is decoded, the same algorithm is performed and the resulting value checked against the checksum field to verify the correctness of the code.

Each of the fields 2A–2E of the bar code 2 may comprise one or more bar code characters and each bar code character may comprise a sequence of reflective (white) and non-reflective (black) elongated bars or elements. Encoding of these elements can take on a number of conventional forms. Examples of these forms are "module width" encoding and "non-return-to-zero" encoding. In the former encoding, the elements can take on a wide width or a narrow width which correspond to a "0" data bit and a "1" data bit, respectively, a sequence of these wide and narrow elements, forming a given character. In the latter encoding, the reflectivity and non-reflectivity of the elements result in "0" and "1" data bit, respectively, and a width of these elements again forms a given character. Typically, each character of a bar code will correspond to a given numeric or alphanumeric character.

In the present case, the characters of the bar codes 2 preferably represent numeric characters and the encoding is preferably module width coding. A preferable form of module width encoding is Interleaved 2 of 5 Coding which has a high information density and contains two wide elements within a five element character. In this type of encoding, intercharacter spaces are eliminated by interleaving characters encoded in the bars with characters encoded in the spaces. It should be noted that the number of characters utilized in any field of each bar code 2 will depend upon the information to be carried in the field. Additionally, the size of the article 3 as well as the printing technique for the code and the quality of the article surface will dictate the

overall size and, therefore, number of characters which can be used in any of the bar codes 2.

As above-indicated, each bar code 2 is unique in that it contains an instruction field 2B which carries data related to an action or actions to be taken and a reference field 2C which contains data related to the data in the instruction field. FIG. 4 is a table which shows respective actions able to be identified by corresponding codes, i.e. , $Code_1$, $Code_2$, etc., in the instruction field of a bar code 2. In the present example, each code typically will comprise one or more numeric bar code characters.

As can be seen from the table, the first six of the actions listed are specific actions which deal with playing or reading and recording messages. In the case of these actions, the data in the reference field of the bar code will indicate or point to the location in the application processor from which the message associated with the action is to be retrieved or into which the message is to be recorded. Accordingly, when the DTMF tones, i.e. , $DTMF_1$, $DTMF_2$, etc. corresponding to each of these actions and the related reference data field DTMF tones are received by the application processor 4A, the processor recognizes the tones and associated codes and performs the actions specified.

The function actions in the table, i.e., $Func_1$, $Func_2$, etc., allow for and identify more complex actions to be carried out by the application processor 4A. These actions are also identified by corresponding Codes in the instruction field and transmitted via corresponding DTMF tones.

In the present illustrative case, these complex actions are to be carried out by the application processor 4A using reference field data in a previously scanned or subsequently scanned bar code. This may be indicated by the function Code in the bar code and/or by making the reference field in the bar code contain one or more preselected characters or be a null or empty field. When the application processor 4A recognizes a function Code in the instruction field of a bar code and a null in the reference field of the bar code, the application processor then look for data identified in the reference field of a previously or subsequently scanned bar code. This is determined by the specific function Code and the programming of the application processor.

If the data to be used is that in the reference field of a subsequently scanned bar code, the application processor 4A will disregard any action specified in the instruction field of the subsequent bar code. It will, thus, not perform the action specified, but instead will use the data in the reference field of the second scanned code in carrying out the complex actions identified in the first scanned code.

The table of FIG. 4 also illustrates certain representative command actions, Com_1, Com_2, etc., which are also identified by corresponding Codes in the instruction field of a scanned bar code 2. Bar codes carrying a command action also carry one or more preselected characters or a null or empty in their respective reference field, since the command actions are general actions which do not require, specific data to be pointed to for their performance. Rather, more general data is applicable to the command actions and the application processor 4A recognizes this from the associated Codes and, if necessary, obtains any reference data from its memory 4B.

Having described representative actions which can be specified by the coded data in the instruction field of the bar codes 2 of the invention, examples of services provided by the application processor 4A in conjunction with these bar codes will now be described. FIG. 5 illustrates one such service in which the application processor 4A provides advertisement information to a user based on a yellow page advertisement 51.

As shown, the advertisement 51 is for the XYZ Tire Co. which sells automobile tires. A bar code 52 in accord with the invention is included in the ad to enable a user to access daily special information. The bar code 52 will thus contain the code Code 1 in its instruction field indicative of the action to play a message and will contain data in its reference field identifying the location in the memory 4B of the application processor 4A which contains the daily special information for the XYZ Co.

When the bar code 52 is thus scanned by the wand 6 of the bar code reader 5, the reader interface 7 accepts the bar code data from the wand, separates the data in the bar code fields and establishes a communications path through the telephone network 11A to the application processor 4A as above-discussed. The interface then transmits the separated data fields to the application processor via the corresponding DTMF tones.

When the application processor 4A receives these tones, it recognizes that the instruction field tone identifies the action to play a message and that the reference field tones identify the memory location of the daily special message of the XYZ Co. The application processor 4A will therefore cause the daily special message to be played from the identified memory location and to be transmitted to the user at the reader interface 7 who can listen to the message over the telephone station 9.

After the daily special message is played to the user the user can then terminate the connection to the application processor by placing the telephone station 9 on-hook. More particularly, this on-hook condition is recognized by the network 11 so that the voice path to the application processor is terminated. Also, the on-hook condition is detected at the off-hook detector 7D of the interface 7 and this is reported to the microcontroller 7A which then terminates acceptance of data from the wand 6.

However, if the user desires to receive further information regarding the advertiser, XYZ Co., the user can now scan a further bar code 53 which is also included in the ad and, in the case shown, identifies distance/location information of the advertiser. When this bar code is scanned, the interface 7 again receives the data in the fields of the bar code and separates the data. Since the microcontroller 7A in this case recognizes that there is an existing off-hook telephone condition and, therefore, that there is already in place a communication path to the application processor 4A, the microcontroller does not perform the auto-dial function. Instead, the microcontroller proceeds by causing the transmission of the bar code data via the appropriate DTMF tones.

Unlike the play action in the bar code 52, the distance/location action in the bar code 53 is a complex action requiring the distance from the user's location to the advertiser's location to be first determined. The instruction field of the bar code 53 thus contains the Code identifying the the distance/location function, while the reference field of the bar code 53 will contain a null or void.

Accordingly, upon the data fields of the bar code 53 being received at the application processor 4A, the processor 4A recognizes from the instruction field data that the distance/location function is to be performed

and from the null in the reference field that the data for performing the function is identified in the reference field of another bar code. The processor 4A will then look to an immediately preceding or succeeding scanned bar code for the reference field data.

In the present case, the bar code 52 was scanned immediately preceding the bar code 53, so the processor 4A will use the data identified by the reference field in the bar code 52 to carry out the function. This data contains the identification location for the advertiser. The application processor 4A using this location information and information concerning the location of the user obtained from the stored information in the memory 4B under the reader ID, then performs the distance calculation. After the calculation is made, the application processor 4A transmits the distance information to the reader interface 7 which couples it to telephone station 9 where it can be heard by the user. The distance information may also be accompanied by a statement indicating to the user that if the location of the advertiser is also desired, the user need only scan the bar code 53 again to obtain this information.

Upon the user scanning the bar code 53 again, the coded data in the instruction field of the bar code when received by the program will now be understood by the application processor 4A as requiring a location determination. The program will, therefore, determine the location of the advertiser in relation to the user again using the advertiser data identified by the reference field of the previously scanned bar code 52 and the user information identified by the reader ID. The location information will then be transmitted by the application processor 4A to the user as a voice message over the network 11A and telephone station 9 to complete the action.

FIG. 6 shows an example of the application of the bar codes and system of the invention to a catalogue ordering service provided by the application processor 4A. In this case, a catalogue 61 contains an advertisement showing products 62A and 62B being offered for sale. Bar codes 63A and 63B, are adjacent the respective products and a further bar code 64, labelled ORDER, is also situated on the catalogue page.

Each of the bar codes 63A, 63B and 64 is a bar code in accordance with the invention. More particularly, the bar codes 63A and 63B are codes which define a play message action with respect to their adjacent products, while the bar code 64 defines a more complex order function. The bar code 64 will thus have a null in its reference field and, if scanned, will require reference field data from one of the other bar codes 63A or 63B

If a bar code adjacent a particular one of the products 62A and 62B is scanned by the wand 6, the interface 7 will again dial the application processor 4A to establish a voice path thereto through the network 11A. The bar code instruction and reference fields will contain, respectively, the play message $Code_1$ and data identifying the location of the message to be played.

Upon the application processor 4A receiving the data in these fields, the processor will retrieve the message identified by the data and play the message so it is heard by the user. The message may, for example, describe certain details regarding the product and request the user to scan the bar code 64 if the user wishes to order the product.

If the bar code 64 is now scanned, the application processor will then proceed to perform the order function. In this case, the program will use data identified by the reference field of the first bar code scanned, either bar code 63A or 63B, and the stored information identified by the user ID to complete the steps required to order the product for the user.

FIG. 7 shows another application of the bar codes and system of the invention. In this case, the bar codes and system are adapted for use in providing a voice message service. In particular, a voice note 71 is provided. The voice note 71 has bar codes 72, 73 and 74 which allow a user to play a message, record a message and stop playing a message, respectively.

In this case, the bar codes 72–74 carry in their instruction fields $Code_1$, $Code_2$ and $Code_3$ which identify, respectively, the play, record and stop play message actions. The reference field in each bar code, in turn, contains data which identifies the specific location or locations in the memory 4B from or into which the message is to be read. By scanning the bar code 73 the application processor 4A recognizes from the instruction and reference field data that a message is to be recorded at a given location in the memory. The user then recites the message at the telephone station and the message is recorded.

If an already stored message is to be played by the user, the user scans the bar code 72. As a result, the application processor 4A recognizes from the bar code data in the instruction and reference fields that a message is to be played from the memory location identified in the reference field. The application processor then retrieves the message and plays it to the user. If the user desires playing of the message to be terminated before the end of the message, the user can then scan the stop play bar code 74 and the data in this bar code will cause the application processor to stop playing the message.

When using the voice note 71, a first user can record a message to be sent to a second user using the above procedure. The first user can then transmit the voice note to the second user who can then play the message, as above-described to determine its content. The second user can also record a response message on the note and transmit it to the first user.

It should be noted that while the description of the operation of the system 1 in conjunction with the services described in FIGS. 5–6 describes scanning of the function bar codes 53 and 64 after the bar codes 52 and 63A or 53B have been scanned, the system can also operate by scanning the function bar codes first. In such case, the application processor would wait for the other bar code to be scanned, i.e., 52, 63A or 63B, to identify the location of the data for performing the functions in the first scanned code. The processor would then perform these functions using this data and disregard the instruction, if any, specified in the second scanned code.

It should be also noted that the bar codes and system of the invention have been discussed above in terms of a centralized application processor 4A. However, the system could also function with an application processor at each of the service providers 10 connected to the system with or without a centralized processor. In such case, the bar codes 2 of the invention could be modified to include a telephone number field to identify the application processors at the individual service providers.

With such a modification, the microcontroller 7A of the interface could contain a look-up table correlating the telephone numbers of the different application processors of the service providers with corresponding bar code characters to be carried in the telephone fields of the bar codes. When a particular character is then found

in the telephone field of a bar code, the look-up table of the interface will then provide the associated telephone number to be dialed by the interface. If no telephone field character is present and there is a centralized application processor, the interface will then dial the centralized processor.

The bar codes of the invention might also be such as to have an instruction field which is a null or empty and a reference field which contains data. In this case, the application processor can be designed to act on the data specified in the reference field of the bar code based on an action specified in a subsequently or previously scanned bar code. This type of operation could, for example, be implemented in the catalogue ordering service described in connection with FIG. 6.

In particular, the bar codes 63A and 63B could be modified so that their instruction fields contained a null, and a further instruction code 65, shown in dotted line and entitled DESCRIBE, could be added to provide the play message action. In this case, the reference field of the bar code 65 could be a null field also, indicating the action specified is to be carried out based on data in another bar code.

With the FIG. 6 bar codes modified as above, scanning the bar code 63A would provide the application processor 4A with a reference field identifying the data to be acted on and subsequent scanning of the bar code 65 would define the action to be taken on this data. In the present case, scanning the two bar codes would result in playing the message in the identified memory location.

The bar code 2 of the invention can also be utilized as a dialer by using the instruction field data to specify a dial action and the reference field data to identify the number to be dialed. In this case when the reader 5 reads the bar code and separates the characters, it will recognize the dial function. It will then dial the number identified in the reference field, instead of dialing the application processor 4A as above-described.

In a further aspect of the invention, FIG. 8 illustrates a specific bar code configuration usable with the invention and provided with visible indicia which distinguish the bar code from standard bar codes in use today. More particularly, the bar code 91 is provided with a reflective (white) or non-reflective (black) element 91A having a preselected width which makes it visibly distinguishable from the other reflective and non-reflective elements in the code.

In the present case, the element 91A is shown as a reflective element and acts as a field separator between the instruction field elements of the bar code and the reference field elements. In a preferred construction of the bar code 91, the element 91A is from 3 to 5 times as wide as the widest bar code element.

In the case shown, the bar code 91 is also provided with non-reflective (black) bars which border the upper and lower ends of the elements of the code and extend along the code width. These borders may be from 1 to 2 times as wide as the width of the widest non-reflective element.

Use of the element 91A in the bar code 91 enables the bar code to be readily visibly distinguishable from other bar codes in present day use. As a result, users of the system 1 are prevented from accidently scanning more standard bar codes which would result in an error message being generated by the system 1.

With use of the bar code 91, the microcontroller 7A of reader 5 would be adapted to recognize the element 91A and the borders 91B, 91C to verify that a proper bar code had been read. If these were not detected, the reader 5 would provide an error message indicating an invalid bar code.

The element 91A may also be provided with a symbol to further visibly highlight its presence. The symbol could be a letter or other mark (shown in dotted line in FIG. 8 as an S) which was printed in a manner so as not to be readable by the reader. The latter can be accomplished by making the symbol a color, such as, for example, red which the wand 6 is not able to sense.

The use of the field separator 91A also allows the number of elements or characters in the instruction and reference fields to be controlled. In the bar code 91 illustrated in FIG. 8, the instruction field has 3 characters and the reference field 9 with stop and start field characters being located at the respective beginning of the instruction field and end of the reference field, respectively.

The use of the separator field 91A is also advantageous in that it enables two separate checks to be made on the bar code by checking the number of digits between the start code and the separator field and between the separator field and end code. In this way, reliability of the bar code reader can be improved.

Also, the use of the side borders 91B,91C likewise improves reading reliability, since scanning these areas will likely result in a non-reflective element signal whose width will exceed that of the widest element in the code. This signal will indicate than an error condition has occurred as a result of scanning outside the extent of the bar code elements.

In all cases it is understood that the above-described arrangements are merely illustrative of the many possible specific embodiments which represent applications of the present invention. Numerous and varied other arrangements, can be readily devised in accordance with the principles of the present invention without departing from the spirit and scope of the invention.

What is claimed is:

1. A bar code including a plurality of bar code fields, each of said fields including one or more bar code characters, a first bar code field containing data related to at least an action to be performed and a second bar code field containing data related to the data in said first bar code, said bar code characters being one of reflective and non-reflective, and said bar code having a start field at the beginning of said bar code and a stop field at the end of said bar code, and said bar code further having a separator field between said stop and start fields, said separator field including a character which is one of reflective and non-reflective and of a width which exceeds the width of any of the other bar code characters included in said bar code.

2. A bar code in accordance with claim 1 wherein: said character of said separator field has a width which is in the range of three to five times the width of the widest of the other bar code characters included in said bar code.

3. A bar code in accordance with claim 1 wherein: said separator field is bordered at one end by said first bar code field and at the other end by said second bar code field.

4. A bar code in accordance with claim 1 wherein: said character of said separator field has a reflective symbol therein.

5. A bar code in accordance with claim 1 wherein:

said bar code further includes a first non-reflective element bridging the top ends of all the characters of said bar code and a second non-reflective element bridging the bottom ends of all the characters of said bar code.

6. A system comprising:

at least one bar code, each bar code including a plurality of bar code fields, each of said fields including one or more bar code characters, a first bar code field containing data related to at least an action to be performed and a second bar code field containing data related to the data in said first bar code field;

means for reading a bar code to separate the fields of said bar code;

processing means responsive to said reading means for processing the data in said first and second fields of each said read bar code;

said processing means enabling the performance of the action to which the data in said first field of a first bar code relates based on the data in the second field of said first bar code;

said data in said second bar code field of said first bar code indicating that the action to which data in said first bar code field of said first bar code relates is to be carried out based on further data which is other than said data in the second bar code field of said first bar code;

and said processing means enables the performance of the action to which the data in the first bar code field of said first bar code relates based on said further data.

7. A system in accordance with claim 6 wherein:

said indication is provided by said data in said second bar code field of said first bar code being one of a null and a preselected character or characters.

8. A system comprising:

at least one bar code, each bar code including a plurality of bar code fields, each of said fields including one or more bar code characters, a first bar code field containing data related to at least an action to be performed and a second bar code field containing data related to the data in said first bar code field;

means for reading a bar code to separate the fields of said bar code;

processing means responsive to said reading means for processing the data in said first and second fields of each said read bar code;

said processing means enabling the performance of the action to which the data in said first field of a first bar code relates based on the data in the second field of said first bar code;

said data in said first bar code field of said first bar code indicating that the data in said second bar code field of said first bar code relates to further data which is related to an action and which is in other than in said first bar code;

and said processing means enabling the performance of the action to which said further data relates based on the data in said second bar code field of said first bar code.

9. A system in accordance with claim 8 wherein:

said indication is provided by the data in said first bar code field of said first bar code being one of a null and a preselected character or characters.

10. A system comprising:

at least one bar code, each bar code including a plurality of bar code fields, each of said fields including one or more bar code characters, a first bar code field containing data related to at least an action to be performed and a second bar code field containing data related to the data in said first bar code field;

means for reading a bar code to separate the fields of said bar code;

processing means responsive to said reading means for processing the data in said first and second fields of said bar code;

said data in said first bar code field of a first bar code relating to a first action in a first reading of said first bar code and to a second action in a second reading of said first bar code;

said reading means making first and second readings of said first bar code;

and said processing means enabling the performance of said first action in response to said first reading of said first bar code and to said second action in response to said second reading of said first bar code.

11. A system comprising:

a plurality of bar codes, each bar code including a plurality of bar code fields, each of said fields including one or more bar code characters, a first bar code field containing data related to at least an action to be performed and a second bar code field containing data related to the data in said first bar code field;

means for reading a bar code to separate the fields of said bar code;

processing means responsive to said reading means for processing the data in said first and second fields of each said read bar code;

the data in the second bar code field of a first bar code indicates that the action to which the data in the first bar code field of said first bar code relates is to be carried out using the data in the second bar code field of a second of said plurality of bar codes; and

said processing means upon said first bar code and said second bar code being read enabling the performance of the action to which the data in the first field of said first bar code relates based on the data in the second bar code field of said second bar code.

12. A system in accordance with claim 11 wherein:

when said reading means reads said first bar code before reading said second bar code, said processing means fails to enable performance of the action related to the data in the first bar code field of said second bar code.

13. A system in accordance with claim 11 wherein:

the data in the first bar code field of said second bar code indicates that the data in the second bar code field of said second bar code relates to data related to an action and included the first bar code field of said first bar code.

14. A system in accordance with claim 13 wherein:

said indication by said data in the second bar code field of said first bar code is provided by said data in the second bar code field of said first bar code being one of a null and a preselected character or characters;

and said indication by said data in the first bar code field of said second bar code is provided by said data in the first bar code field of said second bar

code being one of a null and a preselected character or characters.

15. A system in accordance with claim 11 wherein:

said indication by said data in the second bar code field of said first bar code is provided by said data in said second bar code field of said first bar code being one of a null and a preselected character or characters.

16. A system in accordance with claim 10 wherein:

the data in the first bar code field of a first bar code indicates that the data in the second bar code field of said first bar code relates to data related to an action and included in the first bar code field of second of said plurality of bar codes;

and said processing means upon said first bar code and said second bar code being read enables the performance of the action related to the data in the first bar code field of the second bar code based on the data in the second bar code field of the first bar code.

17. A system in accordance with claim 16 wherein:

said indication by the data in said first bar code field of said first bar code is provided by said data in the first bar code field of said first bar code being one of a null and a preselected character or characters.

18. A system comprising:

at least one bar code, each bar code including a plurality of bar code fields, each of said fields including one or more bar code characters, a first bar code field containing data related to at least an action to be performed and a second bar code field containing data related to the data in said first bar code field;

means for reading a bar code to separate the fields of said bar code;

processing means responsive to said reading means for processing the data in said first and second fields of each said read bar code;

said reading means including a unique identification code;

and said processing means before processing the bar code fields read by said reading means must receive from said reading means said unique identification code.

19. A system in accordance with claim 6, 8, 10, 11 or 18 further comprising:

a telephone network for enabling a communication path to be established between said reading means and said processing means.

20. A system in accordance with claim 19 further comprising:

a telephone station

a telephone line connecting said station and said reading means to said telephone network.

21. A system in accordance with claim 20 wherein:

said reading means couples signals indicative of the data in the fields of a read bar code to said telephone line for transmission over said communication path to said processing means.

22. A system in accordance with claim 21 wherein:

said communication path is a voice path; and said signals comprise DTMF tones.

23. A bar code including a plurality of bar code fields, each of said fields including one or more bar code characters each of which is one of reflective and non-reflective, said bar code fields including a start field at the beginning of said bar code, a stop field at the end of said bar code and a separator field between said stop and start fields, said separator field including a character which is one of reflective and non-reflective and of a width which exceeds the width of any of the other bar code characters included in said bar code.

24. A bar code in accordance with claim 23 wherein:

said character of said separator field has a width in the range of three to five time the width of the widest of the other bar code characters included in said bar code.

25. A bar code in accordance with claim 23 wherein:

said character of said separator field has a reflective symbol therein.

26. A bar code in accordance with claim 23 wherein:

said bar code further includes a first non-reflective element bridging the top ends of all the characters of said bar code and a second non-reflective element bridging the bottom ends of all the characters of said bar code.

27. A method comprising:

providing at least one bar code, each bar code including a plurality of bar code fields, each of said fields including one or more bar code characters, a first bar code field containing data related to at least an action to be performed and a second bar code field containing data related to the data in said first bar code field;

reading a bar code to separate the fields of said bar code field;

processing the data in said first and second fields of each said read bar code;

said processing including enabling the performance of the action to which the data in said first field of a first bar code relates based on the data in the second field of said first bar code;

said data in said second bar code field of said first bar code indicating that the action to which data in said first bar code field of said first bar code relates is to be carried out based on further data which is other than said data in the second bar code field of said first bar code;

and said processing enabling the performance of the action to which the data in the first bar code field of said first bar code relates based on said further data.

28. A method in accordance with claim 27 wherein:

said indication is provided by said data in said second bar code field of said first bar code being one of a null and a preselected character or characters.

29. A method comprising:

providing at least one bar code, each bar code including a plurality of bar code fields, each of said fields including one or more bar code characters, a first bar code field containing data related to at least an action to be performed and a second bar code field containing data related to the data in said first bar code field;

reading a bar code to separate the fields of said bar code field;

processing the data in said first and second fields of each said read bar code;

said data in said first bar code field of a first bar code indicating that the data in said second bar code field of said first bar code relates to further data which is related to an action and which is in other than in said first bar code;

and said processing enabling the performance of the action which said further data relates based on the

data in said second bar code field of said first bar code.

30. A method in accordance with claim 29 wherein:

said indication is provided by the data in said first bar code field of said first bar code being one of a null and a preselected character or characters.

31. A method comprising:

providing at least one bar code, each bar code including a plurality of bar code fields, each of said fields including one or more bar code characters, a first bar code field containing data related to at least an action to be performed and a second bar code field containing data related to the data in said first bar code field;

reading a bar code to separate the fields of said bar code field;

processing the data in said first and second fields of each said read bar code;

said data in said first bar code field of a first bar code relating to a first action in a first reading of said bar code and to a second action in a second reading of said first bar code;

said reading step including making first and second readings of said first bar code;

and said processing enabling the performance of said first action in response to said first reading of said first bar code and said second action in response to said second reading of said first bar code.

32. A method comprising:

providing at least one bar code, each bar code including a plurality of bar code fields, each of said fields including one or more bar code characters, a first bar code field containing data related to at least an action to be performed and a second bar code field containing data related to the data in said first bar code field;

reading a bar code to separate the fields of said bar code field;

processing the data in said first and second fields of each said read bar code;

the data in the second bar code field of a first bar code indicating that the action to which the data in the first bar code field of said first bar code relates is to be carried out using the data in the second bar code field of a second of said plurality of bar codes; and

said processing upon said first bar code and said second bar code being read enabling the performance of the action to which the data in the first field of said first bar code relates based on the data in the second bar code field of said second bar code.

33. A method in accordance with claim 32 wherein:

when said reading step causes said first bar code to be read before said second bar code, said processing fails to enable performance of the action related to the data in the first bar code field f said second bar code.

34. A method in accordance with claim 32 wherein:

the data in the first bar code field of said second bar code indicates that the data in the second bar code field of said second bar code relates to data related to an action and included the first bar code field of said first bar code.

35. A method in accordance with claim 34 wherein:

said indication by said data in the second bar code field of said first bar code is provided by said data in the second bar code field of said first bar code being one of a null and a preselected character or characters;

and said indication by said data in the first bar code field of said second bar code is provided by said data in the first bar code field of said second bar code being one of a null and a preselected character or characters.

36. A method in accordance with claim 32 wherein:

said indication by said data in the second bar code field of said first bar code is provided by said data in said second bar code field of said first bar code being one of a null and a preselected character or characters.

37. A method comprising:

providing a plurality of bar codes, each bar code including a plurality of bar code fields, each of said fields including one or more bar code characters, a first bar code field containing data related to at least an action to be performed and a second bar code field containing data related to the data in said first bar code field;

reading a bar code to separate the fields of said bar code field;

processing the data in said first and second fields of each said read bar code;

the data in the first bar code field of a first bar code indicating that the data in the second bar code field of said first bar code relates to data related to an action and included in the first bar code field of a second of said plurality of bar codes;

and said processing means upon said first bar code and said second bar code being read enabling the performance of the action related to the data in the first bar code field of the second bar code based on the data in the second bar code field of the first bar code.

38. The method in accordance with claim 37 wherein:

said indication by the data in said first bar code field of said first bar code is provided by said data in the first bar code field of said first bar code being one of a null and a preselected character or characters.

* * * * *

US005288976A

United States Patent [19]

Citron et al.

[11] Patent Number: 5,288,976

[45] Date of Patent: Feb. 22, 1994

[54] **BAR CODE USE IN INFORMATION, TRANSACTIONAL AND OTHER SYSTEM AND SERVICE APPLICATIONS**

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[73] Assignee: **Nynex Corporation**, New York, N.Y.

[21] Appl. No.: **729,648**

[22] Filed: **Jul. 15, 1991**

[51] **Int. Cl.**[5] **G06F 15/20**; G06K 19/06

[52] **U.S. Cl.** **235/375**; 235/462; 235/494; 379/102

[58] **Field of Search** 235/375, 462, 494; 340/825.1, 825.29, 825.35; 379/102, 105, 93

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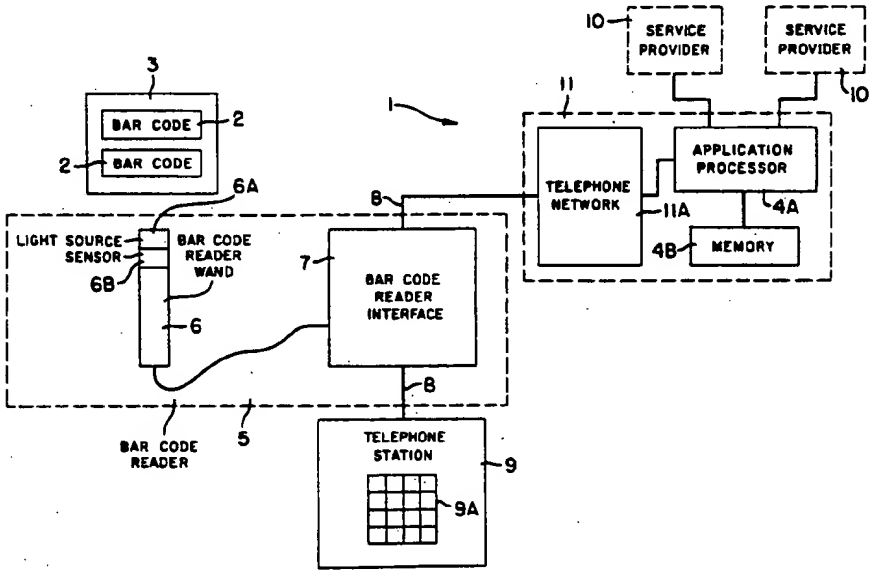
Primary Examiner—Donald Hajec
Assistant Examiner—Esther Chin
Attorney, Agent, or Firm—Loren Swingle; John J. Torrente

[57] **ABSTRACT**

A system which utilizes a bar code having an instruction field whose data specifies an action to be performed and also having a reference field whose data relates to the data in the instruction field. The system reads the instruction and reference fields of the bar code and processess the read data. This processing may determine from the instruction field data that the action or actions to be taken are to be taken on data other than that in the reference field of the bar code. It also may determine from the data in the instruction field that an action to be taken on the data in the reference field is other than an action identified in the instruction field of the bar code. Based on these determinations, the system continues the processing using the appropriate action and data.

A unique bar is also used in the system. This bar code, between its start and stop fields, has a separator field whose width is greater than that of any of the individual bar code characters.

38 Claims, 5 Drawing Sheets



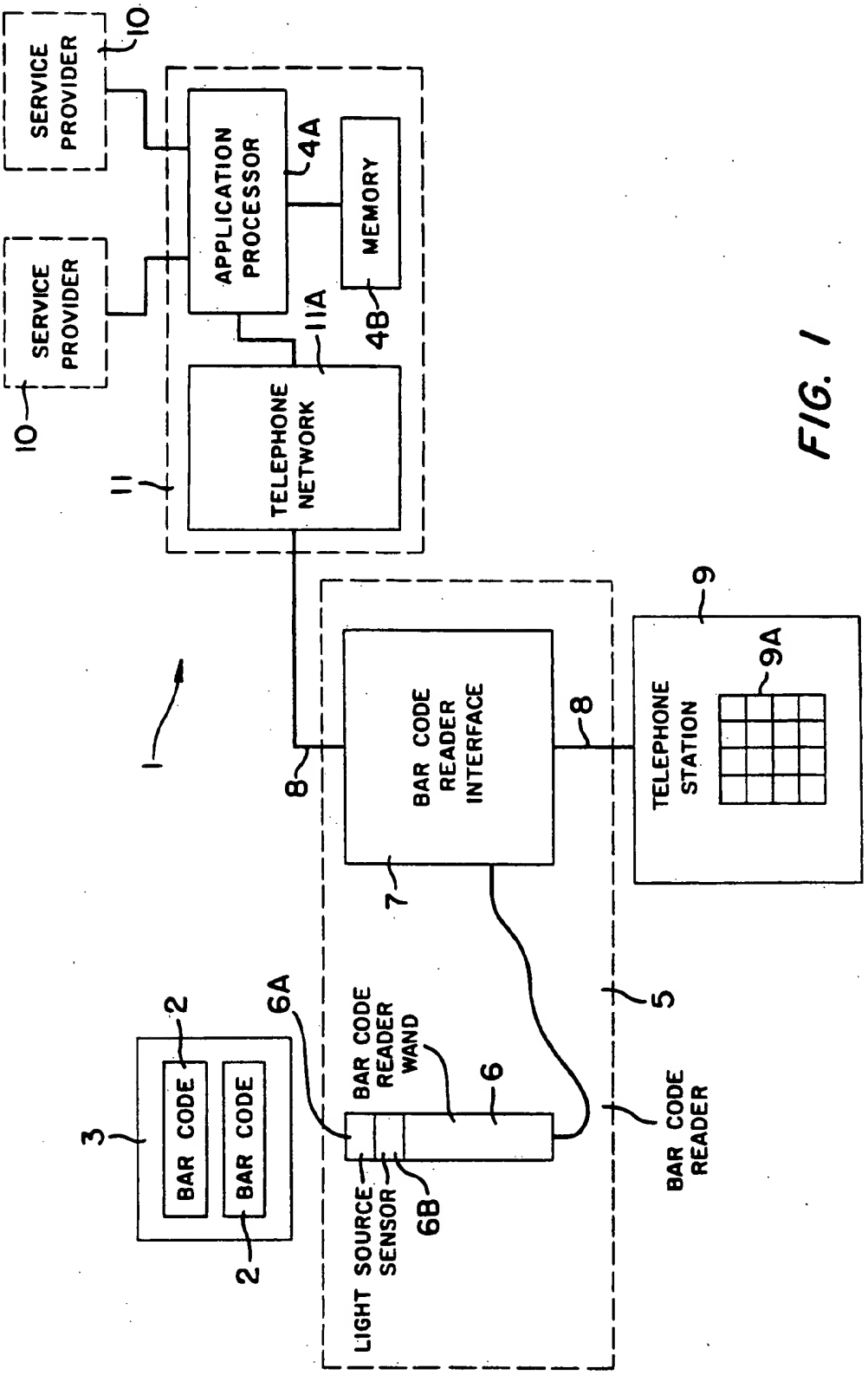

SERVICE PROVIDER
10
SERVICE PROVIDER
10
APPLICATION PROCESSOR
4A
MEMORY
4B
11A
TELEPHONE NETWORK
11
1
8
BAR CODE READER INTERFACE
8
9
TELEPHONE STATION
9A
7
5
BAR CODE READER WAND
6
6A
BAR CODE READER
2
BAR CODE
BAR CODE
2
3
LIGHT SOURCE
SENSOR
6B

FIG. 1

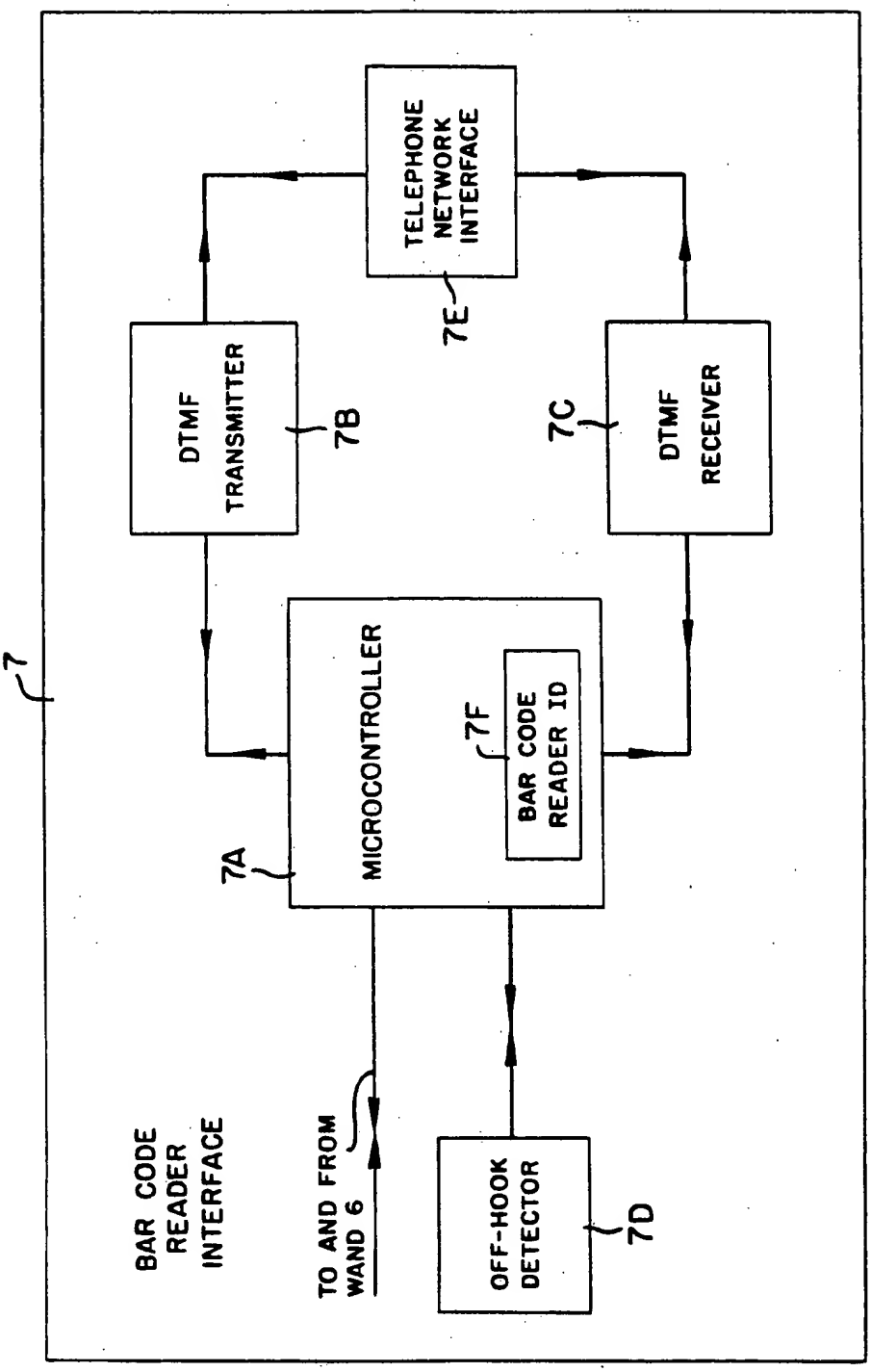

7
TELEPHONE NETWORK INTERFACE
7E
DTMF TRANSMITTER
7B
DTMF RECEIVER
7C
MICROCONTROLLER
7A
BAR CODE READER ID
7F
BAR CODE READER INTERFACE
TO AND FROM WAND 6
OFF-HOOK DETECTOR
7D

FIG. 2

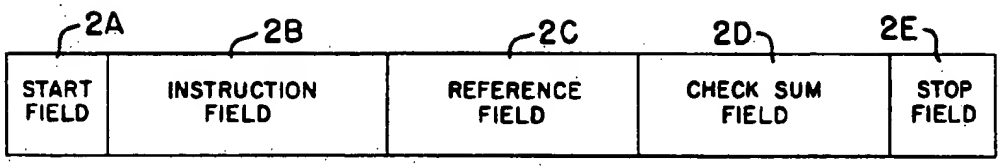


FIG. 3

ACTION	INSTRUCTION FIELD CODES	DTMF TONES
PLAY MESSAGE	$CODE_1$	$DTMF_1$
RECORD MESSAGE	$CODE_2$	$DTMF_2$
STOP / START MESSAGE	$CODE_3$	$DTMF_3$
APPEND MESSAGE	$CODE_4$	$DTMF_4$
ERASE MESSAGE	$CODE_5$	$DTMF_5$
RECORD IF EMPTY OR PLAY	$CODE_6$	$DTMF_6$
$FUNC_1$	$CODE_7$	$DTMF_7$
$FUNC_2$	$CODE_8$	$DTMF_8$
⋮	⋮	⋮
$FUNC_n$	$CODE_{n+8}$	$DTMF_{n+8}$
COM_1	$CODE_{n+9}$	$DTMF_{n+9}$
COM_2	$CODE_{n+10}$	$DTMF_{n+10}$
⋮	⋮	⋮
COM_m	$CODE_{m+n+9}$	$DTMF_{n+m+10}$

FIG. 4

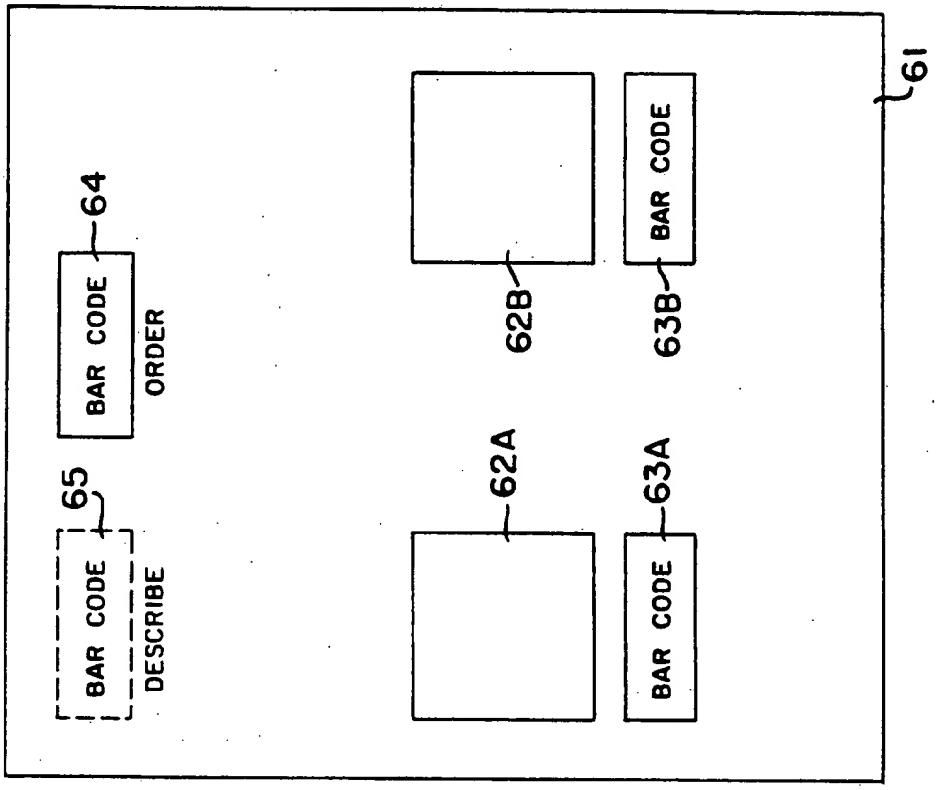

61
64
BAR CODE
ORDER
65
BAR CODE
DESCRIBE
62B
63B
BAR CODE
62A
63A
BAR CODE

FIG. 6

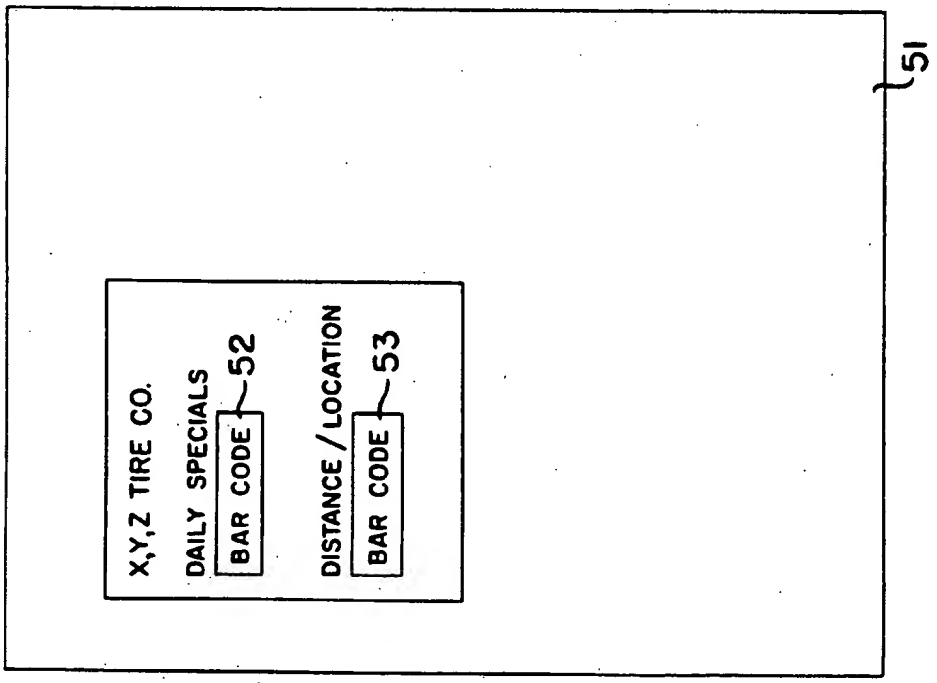

51
X,Y,Z TIRE CO.
DAILY SPECIALS
52
BAR CODE
DISTANCE / LOCATION
53
BAR CODE

FIG. 5

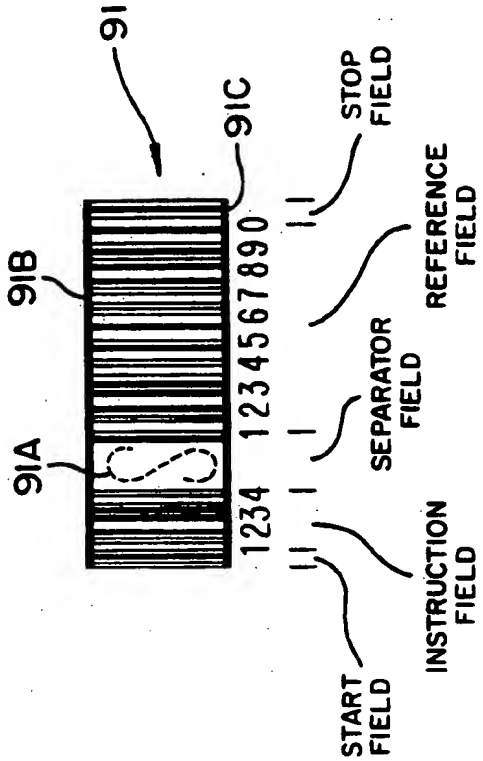

91
91C
91B
91A
1234 1234567890
START FIELD
INSTRUCTION FIELD
SEPARATOR FIELD
REFERENCE FIELD
STOP FIELD

FIG. 8

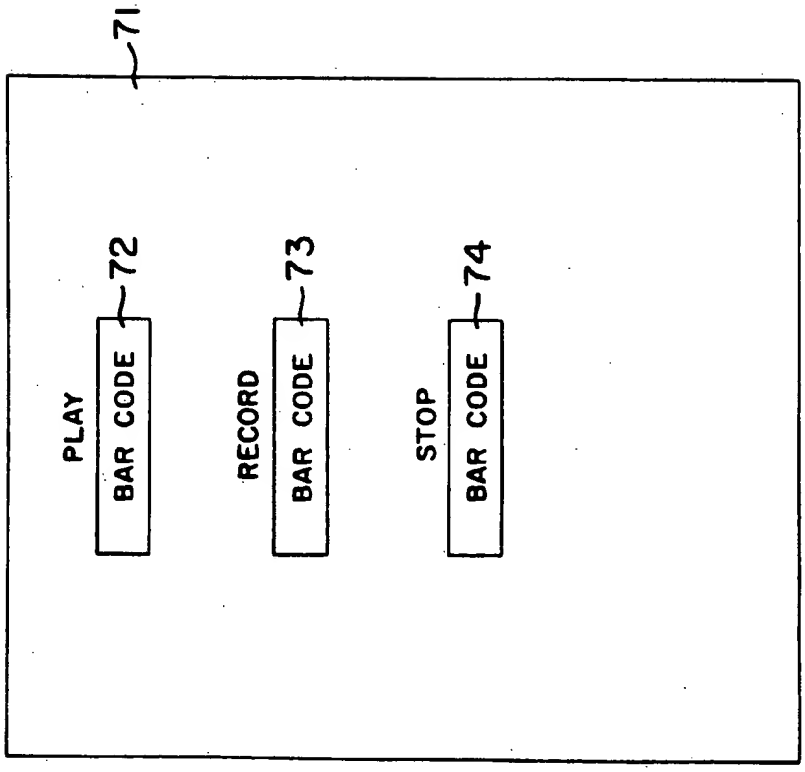

71
PLAY
72
BAR CODE
RECORD
73
BAR CODE
STOP
74
BAR CODE

FIG. 7

BAR CODE USE IN INFORMATION, TRANSACTIONAL AND OTHER SYSTEM AND SERVICE APPLICATIONS

BACKGROUND OF THE INVENTION

This invention relates to information, transactional and other like system and service applications and, in particular, to system and service applications in which bar codes are used.

There are a variety of systems in use today in which bar codes serve as a way of inputting identification information to the system. Thus, for example, in store checkout systems, bar codes placed on the products being sold are scanned to identify the products. This identification information is then passed to a host processor which determines the prices of the scanned products and reports them to an electronic cash register at the store check out.

Another type of system in which bar codes are used for identification purposes is the lottery communication system disclosed in U.S. Pat. No. 4,937,853. In the system of this patent, bar codes are used to identify lottery ticket numbers, invoices numbers, telephone numbers and the like in connection with services provided to a lottery agent. The identified numbers developed by the agent scanning the bar codes are communicated over an interactive telephone network which connects the agent to a host processor. The host processor provides services such as ticket validation, ordering of materials and invoice confirmation.

In the '853 system, voice prompts are provided over a telephone to the lottery agent who can respond by scanning the bar code of any needed numbers. The electrical signals which result from scanning the bar code are then converted into dual tone multi-frequency (DTMF) signals and/or dial pulse signals by execution of an application program which is accessed by a processor at the bar code reader. These signals are then transmitted over the telephone system to the host processor. When a bar code used to identify a telephone number is scanned, the telephone number is retrieved and supplied to an auto dialer which dials the number in DTMF tones or dial pulses.

The '853 patent further mentions that by accessing keys on a bar code interface, data such as a stored telephone number can be retrieved. The retrieved data can then converted to DTMF tones or dial pulses for transmission over the telephone network.

Another system which uses bar codes for identification purposes and for function command purposes is the home ordering system disclosed in U.S. Pat. No. 4,654,482. In this system, orders can be placed from the home over the direct dial telephone network. The orders are placed from printed materials such as catalogues, newspaper inserts or the like advertising materials which carry an item identification bar code adjacent the description of each item. This bar code when scanned is fed to a processing device at the user's location. The user's processing device stores the identification data contained in the scanned bar code along with transactional information of the corresponding merchant.

The user's processing device in the U.S. Pat. No. 4,654,482 system is operated by the user depressing switches to invoke desired actions (e.g., send, select) or to provide desired responses (e.g., yes, no, etc.) in response to prompts on a display. These prompts are generated at the user's processing device based on signals developed locally at the device or based on signals developed at a merchant's host processor. The latter processor communicates with the user's processing device over the direct dial telephone network via a modem. The user's processing device responds to the button actuation by performing certain activities associated therewith. The U.S. Pat. No. 4,654,482 also states that the switches of the user's processing device may be replaced by a plurality of bar code indicia such that each set or group of such indicia corresponds to a function to be enabled by the replaced switch.

In order to make purchases from different merchants using the U.S. Pat. No. 4,654,482 system, cartridges storing transactional information of the different merchants are provided. As an alternative to using different storage cartridges, the patent states that a fixed memory containing all the data for the different merchants can be used. In this case, one or more bar codes can serve to identify the different merchants and, if desired, to provide data associated with the merchants.

A further system which utilizes bar codes for identifying and extracting data is disclosed in U.S. Pat. No. 4,882,475. In the system of this patent, information associated with a food order is stored based upon an order identification number. The latter number is then placed on an order label via encoding the number on a bar code. By then scanning the bar code, the order number is retrieved and the stored information associated with the order number can then be read out. The patent teaches that this information can be read out verbally or electronically into a hand held data unit.

Bar codes are also used in the synthesized voice generating system disclosed in U.S. Pat. No. 4,964,167. In this system, a bar code carries phonetic information, rhythm information and particular processing information associated with a word which is to be verbally reproduced. By scanning the bar code, this information can be retrieved and used to reproduce the word. The patent teaches developing learning devices in the form of books in which bar codes are placed adjacent words whose pronunciation is to be learned.

While all of the above systems teach the use of bar codes in informational and transactional types of service applications and systems, individual bar codes have been used in these systems for either article identification purposes or function identification purposes. This limited use of the bar codes has limited the versatility of the systems.

It is, therefore, an object of the present invention to provide bar codes and an associated system in which a bar code can serve more than a single purpose.

SUMMARY OF THE INVENTION

In accordance with the principles of the present invention, the above and other objectives are realized in a system in which bar codes are used which have at least a first (instruction) field and at least a second (reference) field. The instruction field of each bar contains data or information concerning or related to action to be taken and the reference field contains data or information related to the data in the instruction field.

The data in the instruction field may specify a particular action or identify a set of actions to be taken. The data in the reference field may identify what the specified action or actions are to be taken on. The instruction field data may also indicate that an action is to be taken

on what is identified in the reference field of another bar code. In such case, the data in the reference field will provide a predetermined indication such as, one or more preselected characters, a null or an empty condition, indicating or confirming that the action is to be taken based on data to be obtained from the reference field of another bar code. If the other bar code is one to be subsequently scanned, the action specified in the subsequently scanned bar code will be disregarded in favor of the action specified the first bar code.

The data in the instruction field may also a provide a predetermined indication such as one or more preselected characters, a null or an empty condition, indicating that an action to be taken on the data in the reference field is an action identified in another bar code. In such case, subsequent scanning of the other bar code will result in the action specified in the subsequent bar code being performed on what is identified by the data in reference field of the first bar code.

In accord with the invention, the action in the instruction field may be a command to perform a function, such as play, related to a message, such as a voice message. In such case, the reference field may identify a storage location where the message is to be retrieved from or stored.

The system of the invention utilizes uniquely identified bar code readers each of which is connected to a centralized application processor. In the illustrative case to be disclosed hereinafter, each reader includes an interface for connecting the reader and an associated telephone to a telephone network. The telephone network, in turn, provides access to the centralized application processor which is adapted to interact with and interpret the instruction and reference fields of read bar codes and to provide one or more services to the users of the system.

Upon scanning of a bar code by the bar code reader, the data in the instruction and reference fields of the scanned bar code is retrieved and separated. If the instruction field data indicates a dial action, the reader will dial the number indicated by the data in the reference field. If the instruction field data indicates other than a dial action, the separated data is then transmitted by the bar code reader over the telephone network, as DTMF tones or other signals, to the application processor. The application processor then interprets the received data and reacts accordingly. If the instruction field of a bar code specifies an action and the reference field identifies data to be acted on, the application processor causes the specified action to be performed using the related identified data. On the other hand, if either field is empty or a null, the application processor will look to the needed data elsewhere as, for example, in a field of a previously or subsequently scanned bar code, to cause on action to be performed. The application processor can be further adapted such that a different number of scans over the same bar code will be interpreted as requiring different actions to be performed.

In yet a further aspect of the invention, the bar codes of the invention are adapted to be organized so as to be visibly distinguishable from standard bar codes. In accordance with invention, this adaption takes the form of a pronounced separator field situated between the start and stop fields of the bar code and comprised of a region whose width is greater than the width of any of the individual bar code characters or elements.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other features and aspects of the present invention will become more apparent upon reading the following detailed description in conjunction with the accompanying drawings, in which:

FIG. 1 shows a system and bar codes in accordance with the principles of the present invention;

FIG. 2 shows a block diagram of the bar code reader of the system of FIG. 1;

FIG. 3 illustrates in pictorial form a bar code in accordance with the principles of the present invention;

FIG. 4 shows a table of actions identifiable in the instruction field of the bar code of FIG. 3;

FIG. 5 shows application of the bar codes of the invention in providing an information and advertising service;

FIG. 6 shows application of the bar codes of the invention in providing an information and ordering service for products;

FIG. 7 illustrates application of the bar codes of the invention in performing a voice message service; and

FIG. 8 shows a unique bar code configuration for the bar codes of the invention.

DETAILED DESCRIPTION

FIG. 1 shows a system 1 using bar codes 2 configured in accordance with the principles of the present invention. Each bar code 2 is carried on an article 3 whose nature will depend upon the nature of the services to be provided by the system. As shown, these services are effected by a centralized application processor 4A having a memory 4B.

The application processor 4A may be part of a telephone system 11 which provides the application processor 4A as a feature of the system. In particular, the application processor enables subscribers to access the services of one or more service providers 10 whose service information is included and supplied to the application processor. The application processor might also be included as part of individual service providers, instead of as a centralized unit.

In the present illustrative case of a centralized unit, the application processor 4A may provide any number of information, transactional or other services. For example, the application processor may provide advertisement and ordering services, voice mail services, tracking and other services. These services may be interactive, i.e., require responses by the user of the system.

In the case of product advertising and order services, the article 3 might be a sales brochure, a catalogue, a newspaper, the yellow pages or like publications. In the case of voice mail services, the article 3 might be a simple sheet of paper with identification titles for reading voice messages into and out of the memory 4B of the application processor.

A bar code reader 5 is provided for reading the information or data contained in the bar codes 2. The reader 5, in the case shown, is identifiable in the system 1 by a unique identification number or ID. This ID is assigned to the reader in an initialization procedure during which the reader is granted access to the system. In this procedure, data associated with the user of the reader is stored in the memory 4B of the application processor 4A along with the reader ID. This data might include, the user's name, address, phone number, credit card number, calling card number, a language preference

and a personal identification number (PIN) to be used for security purposes.

As shown, the reader 5 comprises a wand 6 which contains a light source 6A and a sensor 6B for scanning and sensing each bar code 2. The reader 5 also comprises an interface unit 7 which analyzes the sensed bar code signals read by the wand 6.

The interface unit 7 is connected to a telephone line 8 to which is also connected a telephone station 9. The station 9 is shown as a tone type telephone having a tone keypad 9A for developing DTMF tones associated with specific keys actuated on the pad.

The interface unit 7 can be connected serially with or bridged across the telephone line 8 with the station 9. In the case shown, the station 9 and interface 7 are series connected so that voice and tone signals from the station are coupled through the interface to the line 8. The line 8, in turn, couples the signals to a telephone network 11A of the telephone system 11 to which the application processor 4A is also connected.

As shown in FIG. 2, the interface 7 also includes a microcontroller 7A which controls operation of the interface through interaction with a DTMF transmitter 7B, a DTMF receiver 7C, the wand 6, an off-hook detector 7D and a telephone network interface 7E. More particularly, the microcontroller 7A monitors the off-hook condition of the telephone station 9 via the detector 7D and, when an off-hook status is detected, is able to accept signals from the wand 6. It should be noted that, if desired, the microcontroller itself can count the time between communications to determine an off-hook condition. In such case, the detector 7D need not be employed.

Once an off-hook condition is detected, if the wand 6 is now scanned over a bar code 2, the light from the light source 6A reflected from the bar code 2 is received by the sensor 6B of the wand. The sensor 6B then generates electrical signals indicative of the reflected light and thus the data carried by the bar code. These electrical signals are delivered to the microcontroller 7A. The microcontroller then separates the data in the bar code signals and analyzes the separated data.

Unless the data indicates otherwise, the microcontroller 7A will then dial the telephone number of the application processor 4B by causing the DTMF transmitter 7B to transmit to the telephone network interface 7E the DTMF tones associated with the application processor's telephone number. Thus, the interface upon scanning of the bar code 2 acts initially as an auto-dialer for the off-hook telephone station by dialing the application processor.

Upon the application processor 4A answering the call, the telephone station 9 and interface 7 will be connected over a voice path through the line 8 and telephone network 11A to the application processor. To verify this connection, the application processor can echo in DTMF tones a connection code which is received at the interface 7 by the network interface 7E and DTMF receiver 7C for verification at the microcontroller 7A.

Having established connection to the application processor 4A, the microcontroller 7A then transmits the reader ID stored in the memory 7F of the microcontroller, via DTMF tones, which are received at the application processor. The application processor then, using the received reader ID tones, verifies that the reader is a valid reader of the system. This is reported to the reader 5 by the application processor 4A echoing a verification code to the reader.

The reader 5, thereupon, causes the separated bar code data to be transmitted to the application processor 4A also via DTMF tones generated by the DTMF tone transmitter 7B. The application processor 4A, after checking and confirming parity of the data, acknowledges valid receipt of the data by echoing the received tones to the reader. If parity is not confirmed, the application processor 4A may request a resend of the data.

In accordance with the principles of the present invention, the bar code data included in each of the bar codes 2 hand received by the application processor 4A contains information regarding an action or actions to be taken as well as related information. As a result, the versatility of the system 1 and the ability of the application processor 4A to provide services to the users of the system is greatly improved.

More particularly, FIG. 3 shows a pictorial representation of a bar code 2. As shown, the bar code includes a plurality of fields, illustrated, as fields 2A . . . 2E, at least one of which, i.e., the instruction field 2B, contains data or information concerning or related to an action or actions to be taken, and at least a second one of which, i.e., the reference infield 2C, contains data related to the data in the instruction field. In the present illustrative case, bar code 2 also includes a start field 2A and a stop field 2E which indicate the beginning and end of the bar code, respectively, and a checksum field 2D which is used verify the correctness of the bar code when decoded.

More particularly, the value of the checksum field 2D is determined when the bar code 2 is created usually by an algorithm performed on the characters of the code. When the code is decoded, the same algorithm is performed and the resulting value checked against the checksum field to verify the correctness of the code.

Each of the fields 2A–2E of the bar code 2 may comprise one or more bar code characters and each bar code character may comprise a sequence of reflective (white) and non-reflective (black) elongated bars or elements. Encoding of these elements can take on a number of conventional forms. Examples of these forms are "module width" encoding and "non-return-to-zero" encoding. In the former encoding, the elements can take on a wide width or a narrow width which correspond to a "0" data bit and a "1" data bit, respectively, a sequence of these wide and narrow elements, forming a given character. In the latter encoding, the reflectivity and non-reflectivity of the elements result in "0" and "1" data bit, respectively, and a width of these elements again forms a given character. Typically, each character of a bar code will correspond to a given numeric or alphanumeric character.

In the present case, the characters of the bar codes 2 preferably represent numeric characters and the encoding is preferably module width coding. A preferable form of module width encoding is Interleaved 2 of 5 Coding which has a high information density and contains two wide elements within a five element character. In this type of encoding, intercharacter spaces are eliminated by interleaving characters encoded in the bars with characters encoded in the spaces. It should be noted that the number of characters utilized in any field of each bar code 2 will depend upon the information to be carried in the field. Additionally, the size of the article 3 as well as the printing technique for the code and the quality of the article surface will dictate the

overall size and, therefore, number of characters which can be used in any of the bar codes 2.

As above-indicated, each bar code 2 is unique in that it contains an instruction field 2B which carries data related to an action or actions to be taken and a reference field 2C which contains data related to the data in the instruction field. FIG. 4 is a table which shows respective actions able to be identified by corresponding codes, i.e. , $Code_1$, $Code_2$, etc., in the instruction field of a bar code 2. In the present example, each code typically will comprise one or more numeric bar code characters.

As can be seen from the table, the first six of the actions listed are specific actions which deal with playing or reading and recording messages. In the case of these actions, the data in the reference field of the bar code will indicate or point to the location in the application processor from which the message associated with the action is to be retrieved or into which the message is to be recorded. Accordingly, when the DTMF tones, i.e. , $DTMF_1$, $DTMF_2$, etc. corresponding to each of these actions and the related reference data field DTMF tones are received by the application processor 4A, the processor recognizes the tones and associated codes and performs the actions specified.

The function actions in the table, i.e., $Func_1$, $Func_2$, etc., allow for and identify more complex actions to be carried out by the application processor 4A. These actions are also identified by corresponding Codes in the instruction field and transmitted via corresponding DTMF tones.

In the present illustrative case, these complex actions are to be carried out by the application processor 4A using reference field data in a previously scanned or subsequently scanned bar code. This may be indicated by the function Code in the bar code and/or by making the reference field in the bar code contain one or more preselected characters or be a null or empty field. When the application processor 4A recognizes a function Code in the instruction field of a bar code and a null in the reference field of the bar code, the application processor then look for data identified in the reference field of a previously or subsequently scanned bar code. This is determined by the specific function Code and the programming of the application processor.

If the data to be used is that in the reference field of a subsequently scanned bar code, the application processor 4A will disregard any action specified in the instruction field of the subsequent bar code. It will, thus, not perform the action specified, but instead will use the data in the reference field of the second scanned code in carrying out the complex actions identified in the first scanned code.

The table of FIG. 4 also illustrates certain representative command actions, Com_1, Com_2, etc., which are also identified by corresponding Codes in the instruction field of a scanned bar code 2. Bar codes carrying a command action also carry one or more preselected characters or a null or empty in their respective reference field, since the command actions are general actions which do not require, specific data to be pointed to for their performance. Rather, more general data is applicable to the command actions and the application processor 4A recognizes this from the associated Codes and, if necessary, obtains any reference data from its memory 4B.

Having described representative actions which can be specified by the coded data in the instruction field of the bar codes 2 of the invention, examples of services provided by the application processor 4A in conjunction with these bar codes will now be described. FIG. 5 illustrates one such service in which the application processor 4A provides advertisement information to a user based on a yellow page advertisement 51.

As shown, the advertisement 51 is for the XYZ Tire Co. which sells automobile tires. A bar code 52 in accord with the invention is included in the ad to enable a user to access daily special information. The bar code 52 will thus contain the code Code 1 in its instruction field indicative of the action to play a message and will contain data in its reference field identifying the location in the memory 4B of the application processor 4A which contains the daily special information for the XYZ Co.

When the bar code 52 is thus scanned by the wand 6 of the bar code reader 5, the reader interface 7 accepts the bar code data from the wand, separates the data in the bar code fields and establishes a communications path through the telephone network 11A to the application processor 4A as above-discussed. The interface then transmits the separated data fields to the application processor via the corresponding DTMF tones.

When the application processor 4A receives these tones, it recognizes that the instruction field tone identifies the action to play a message and that the reference field tones identify the memory location of the daily special message of the XYZ Co. The application processor 4A will therefore cause the daily special message to be played from the identified memory location and to be transmitted to the user at the reader interface 7 who can listen to the message over the telephone station 9.

After the daily special message is played to the user the user can then terminate the connection to the application processor by placing the telephone station 9 on-hook. More particularly, this on-hook condition is recognized by the network 11 so that the voice path to the application processor is terminated. Also, the on-hook condition is detected at the off-hook detector 7D of the interface 7 and this is reported to the microcontroller 7A which then terminates acceptance of data from the wand 6.

However, if the user desires to receive further information regarding the advertiser, XYZ Co., the user can now scan a further bar code 53 which is also included in the ad and, in the case shown, identifies distance/location information of the advertiser. When this bar code is scanned, the interface 7 again receives the data in the fields of the bar code and separates the data. Since the microcontroller 7A in this case recognizes that there is an existing off-hook telephone condition and, therefore, that there is already in place a communication path to the application processor 4A, the microcontroller does not perform the auto-dial function. Instead, the microcontroller proceeds by causing the transmission of the bar code data via the appropriate DTMF tones.

Unlike the play action in the bar code 52, the distance/location action in the bar code 53 is a complex action requiring the distance from the user's location to the advertiser's location to be first determined. The instruction field of the bar code 53 thus contains the Code identifying the the distance/location function, while the reference field of the bar code 53 will contain a null or void.

Accordingly, upon the data fields of the bar code 53 being received at the application processor 4A, the processor 4A recognizes from the instruction field data that the distance/location function is to be performed

and from the null in the reference field that the data for performing the function is identified in the reference field of another bar code. The processor 4A will then look to an immediately preceding or succeeding scanned bar code for the reference field data.

In the present case, the bar code 52 was scanned immediately preceding the bar code 53, so the processor 4A will use the data identified by the reference field in the bar code 52 to carry out the function. This data contains the identification location for the advertiser. The application processor 4A using this location information and information concerning the location of the user obtained from the stored information in the memory 4B under the reader ID, then performs the distance calculation. After the calculation is made, the application processor 4A transmits the distance information to the reader interface 7 which couples it to telephone station 9 where it can be heard by the user. The distance information may also be accompanied by a statement indicating to the user that if the location of the advertiser is also desired, the user need only scan the bar code 53 again to obtain this information.

Upon the user scanning the bar code 53 again, the coded data in the instruction field of the bar code when received by the program will now be understood by the application processor 4A as requiring a location determination. The program will, therefore, determine the location of the advertiser in relation to the user again using the advertiser data identified by the reference field of the previously scanned bar code 52 and the user information identified by the reader ID. The location information will then be transmitted by the application processor 4A to the user as a voice message over the network 11A and telephone station 9 to complete the action.

FIG. 6 shows an example of the application of the bar codes and system of the invention to a catalogue ordering service provided by the application processor 4A. In this case, a catalogue 61 contains an advertisement showing products 62A and 62B being offered for sale. Bar codes 63A and 63B, are adjacent the respective products and a further bar code 64, labelled ORDER, is also situated on the catalogue page.

Each of the bar codes 63A, 63B and 64 is a bar code in accordance with the invention. More particularly, the bar codes 63A and 63B are codes which define a play message action with respect to their adjacent products, while the bar code 64 defines a more complex order function. The bar code 64 will thus have a null in its reference field and, if scanned, will require reference field data from one of the other bar codes 63A or 63B

If a bar code adjacent a particular one of the products 62A and 62B is scanned by the wand 6, the interface 7 will again dial the application processor 4A to establish a voice path thereto through the network 11A. The bar code instruction and reference fields will contain, respectively, the play message $Code_1$ and data identifying the location of the message to be played.

Upon the application processor 4A receiving the data in these fields, the processor will retrieve the message identified by the data and play the message so it is heard by the user. The message may, for example, describe certain details regarding the product and request the user to scan the bar code 64 if the user wishes to order the product.

If the bar code 64 is now scanned, the application processor will then proceed to perform the order function. In this case, the program will use data identified by the reference field of the first bar code scanned, either bar code 63A or 63B, and the stored information identified by the user ID to complete the steps required to order the product for the user.

FIG. 7 shows another application of the bar codes and system of the invention. In this case, the bar codes and system are adapted for use in providing a voice message service. In particular, a voice note 71 is provided. The voice note 71 has bar codes 72, 73 and 74 which allow a user to play a message, record a message and stop playing a message, respectively.

In this case, the bar codes 72–74 carry in their instruction fields $Code_1$, $Code_2$ and $Code_3$ which identify, respectively, the play, record and stop play message actions. The reference field in each bar code, in turn, contains data which identifies the specific location or locations in the memory 4B from or into which the message is to be read. By scanning the bar code 73 the application processor 4A recognizes from the instruction and reference field data that a message is to be recorded at a given location in the memory. The user then recites the message at the telephone station and the message is recorded.

If an already stored message is to be played by the user, the user scans the bar code 72. As a result, the application processor 4A recognizes from the bar code data in the instruction and reference fields that a message is to be played from the memory location identified in the reference field. The application processor then retrieves the message and plays it to the user. If the user desires playing of the message to be terminated before the end of the message, the user can then scan the stop play bar code 74 and the data in this bar code will cause the application processor to stop playing the message.

When using the voice note 71, a first user can record a message to be sent to a second user using the above procedure. The first user can then transmit the voice note to the second user who can then play the message, as above-described to determine its content. The second user can also record a response message on the note and transmit it to the first user.

It should be noted that while the description of the operation of the system 1 in conjunction with the services described in FIGS. 5–6 describes scanning of the function bar codes 53 and 64 after the bar codes 52 and 63A or 53B have been scanned, the system can also operate by scanning the function bar codes first. In such case, the application processor would wait for the other bar code to be scanned, i.e., 52, 63A or 63B, to identify the location of the data for performing the functions in the first scanned code. The processor would then perform these functions using this data and disregard the instruction, if any, specified in the second scanned code.

It should be also noted that the bar codes and system of the invention have been discussed above in terms of a centralized application processor 4A. However, the system could also function with an application processor at each of the service providers 10 connected to the system with or without a centralized processor. In such case, the bar codes 2 of the invention could be modified to include a telephone number field to identify the application processors at the individual service providers.

With such a modification, the microcontroller 7A of the interface could contain a look-up table correlating the telephone numbers of the different application processors of the service providers with corresponding bar code characters to be carried in the telephone fields of the bar codes. When a particular character is then found

in the telephone field of a bar code, the look-up table of the interface will then provide the associated telephone number to be dialed by the interface. If no telephone field character is present and there is a centralized application processor, the interface will then dial the centralized processor.

The bar codes of the invention might also be such as to have an instruction field which is a null or empty and a reference field which contains data. In this case, the application processor can be designed to act on the data specified in the reference field of the bar code based on an action specified in a subsequently or previously scanned bar code. This type of operation could, for example, be implemented in the catalogue ordering service described in connection with FIG. 6.

In particular, the bar codes 63A and 63B could be modified so that their instruction fields contained a null, and a further instruction code 65, shown in dotted line and entitled DESCRIBE, could be added to provide the play message action. In this case, the reference field of the bar code 65 could be a null field also, indicating the action specified is to be carried out based on data in another bar code.

With the FIG. 6 bar codes modified as above, scanning the bar code 63A would provide the application processor 4A with a reference field identifying the data to be acted on and subsequent scanning of the bar code 65 would define the action to be taken on this data. In the present case, scanning the two bar codes would result in playing the message in the identified memory location.

The bar code 2 of the invention can also be utilized as a dialer by using the instruction field data to specify a dial action and the reference field data to identify the number to be dialed. In this case when the reader 5 reads the bar code and separates the characters, it will recognize the dial function. It will then dial the number identified in the reference field, instead of dialing the application processor 4A as above-described.

In a further aspect of the invention, FIG. 8 illustrates a specific bar code configuration usable with the invention and provided with visible indicia which distinguish the bar code from standard bar codes in use today. More particularly, the bar code 91 is provided with a reflective (white) or non-reflective (black) element 91A having a preselected width which makes it visibly distinguishable from the other reflective and non-reflective elements in the code.

In the present case, the element 91A is shown as a reflective element and acts as a field separator between the instruction field elements of the bar code and the reference field elements. In a preferred construction of the bar code 91, the element 91A is from 3 to 5 times as wide as the widest bar code element.

In the case shown, the bar code 91 is also provided with non-reflective (black) bars which border the upper and lower ends of the elements of the code and extend along the code width. These borders may be from 1 to 2 times as wide as the width of the widest non-reflective element.

Use of the element 91A in the bar code 91 enables the bar code to be readily visibly distinguishable from other bar codes in present day use. As a result, users of the system 1 are prevented from accidently scanning more standard bar codes which would result in an error message being generated by the system 1.

With use of the bar code 91, the microcontroller 7A of reader 5 would be adapted to recognize the element 91A and the borders 91B, 91C to verify that a proper bar code had been read. If these were not detected, the reader 5 would provide an error message indicating an invalid bar code.

The element 91A may also be provided with a symbol to further visibly highlight its presence. The symbol could be a letter or other mark (shown in dotted line in FIG. 8 as an S) which was printed in a manner so as not to be readable by the reader. The latter can be accomplished by making the symbol a color, such as, for example, red which the wand 6 is not able to sense.

The use of the field separator 91A also allows the number of elements or characters in the instruction and reference fields to be controlled. In the bar code 91 illustrated in FIG. 8, the instruction field has 3 characters and the reference field 9 with stop and start field characters being located at the respective beginning of the instruction field and end of the reference field, respectively.

The use of the separator field 91A is also advantageous in that it enables two separate checks to be made on the bar code by checking the number of digits between the start code and the separator field and between the separator field and end code. In this way, reliability of the bar code reader can be improved.

Also, the use of the side borders 91B,91C likewise improves reading reliability, since scanning these areas will likely result in a non-reflective element signal whose width will exceed that of the widest element in the code. This signal will indicate than an error condition has occurred as a result of scanning outside the extent of the bar code elements.

In all cases it is understood that the above-described arrangements are merely illustrative of the many possible specific embodiments which represent applications of the present invention. Numerous and varied other arrangements, can be readily devised in accordance with the principles of the present invention without departing from the spirit and scope of the invention.

What is claimed is:

1. A bar code including a plurality of bar code fields, each of said fields including one or more bar code characters, a first bar code field containing data related to at least an action to be performed and a second bar code field containing data related to the data in said first bar code, said bar code characters being one of reflective and non-reflective, and said bar code having a start field at the beginning of said bar code and a stop field at the end of said bar code, and said bar code further having a separator field between said stop and start fields, said separator field including a character which is one of reflective and non-reflective and of a width which exceeds the width of any of the other bar code characters included in said bar code.

2. A bar code in accordance with claim 1 wherein: said character of said separator field has a width which is in the range of three to five times the width of the widest of the other bar code characters included in said bar code.

3. A bar code in accordance with claim 1 wherein: said separator field is bordered at one end by said first bar code field and at the other end by said second bar code field.

4. A bar code in accordance with claim 1 wherein: said character of said separator field has a reflective symbol therein.

5. A bar code in accordance with claim 1 wherein:

said bar code further includes a first non-reflective element bridging the top ends of all the characters of said bar code and a second non-reflective element bridging the bottom ends of all the characters of said bar code.

6. A system comprising:

at least one bar code, each bar code including a plurality of bar code fields, each of said fields including one or more bar code characters, a first bar code field containing data related to at least an action to be performed and a second bar code field containing data related to the data in said first bar code field;

means for reading a bar code to separate the fields of said bar code;

processing means responsive to said reading means for processing the data in said first and second fields of each said read bar code;

said processing means enabling the performance of the action to which the data in said first field of a first bar code relates based on the data in the second field of said first bar code;

said data in said second bar code field of said first bar code indicating that the action to which data in said first bar code field of said first bar code relates is to be carried out based on further data which is other than said data in the second bar code field of said first bar code;

and said processing means enables the performance of the action to which the data in the first bar code field of said first bar code relates based on said further data.

7. A system in accordance with claim 6 wherein:

said indication is provided by said data in said second bar code field of said first bar code being one of a null and a preselected character or characters.

8. A system comprising:

at least one bar code, each bar code including a plurality of bar code fields, each of said fields including one or more bar code characters, a first bar code field containing data related to at least an action to be performed and a second bar code field containing data related to the data in said first bar code field;

means for reading a bar code to separate the fields of said bar code;

processing means responsive to said reading means for processing the data in said first and second fields of each said read bar code;

said processing means enabling the performance of the action to which the data in said first field of a first bar code relates based on the data in the second field of said first bar code;

said data in said first bar code field of said first bar code indicating that the data in said second bar code field of said first bar code relates to further data which is related to an action and which is in other than in said first bar code;

and said processing means enabling the performance of the action to which said further data relates based on the data in said second bar code field of said first bar code.

9. A system in accordance with claim 8 wherein:

said indication is provided by the data in said first bar code field of said first bar code being one of a null and a preselected character or characters.

10. A system comprising:

at least one bar code, each bar code including a plurality of bar code fields, each of said fields including one or more bar code characters, a first bar code field containing data related to at least an action to be performed and a second bar code field containing data related to the data in said first bar code field;

means for reading a bar code to separate the fields of said bar code;

processing means responsive to said reading means for processing the data in said first and second fields of said bar code;

said data in said first bar code field of a first bar code relating to a first action in a first reading of said first bar code and to a second action in a second reading of said first bar code;

said reading means making first and second readings of said first bar code;

and said processing means enabling the performance of said first action in response to said first reading of said first bar code and to said second action in response to said second reading of said first bar code.

11. A system comprising:

a plurality of bar codes, each bar code including a plurality of bar code fields, each of said fields including one or more bar code characters, a first bar code field containing data related to at least an action to be performed and a second bar code field containing data related to the data in said first bar code field;

means for reading a bar code to separate the fields of said bar code;

processing means responsive to said reading means for processing the data in said first and second fields of each said read bar code;

the data in the second bar code field of a first bar code indicates that the action to which the data in the first bar code field of said first bar code relates is to be carried out using the data in the second bar code field of a second of said plurality of bar codes; and

said processing means upon said first bar code and said second bar code being read enabling the performance of the action to which the data in the first field of said first bar code relates based on the data in the second bar code field of said second bar code.

12. A system in accordance with claim 11 wherein:

when said reading means reads said first bar code before reading said second bar code, said processing means fails to enable performance of the action related to the data in the first bar code field of said second bar code.

13. A system in accordance with claim 11 wherein:

the data in the first bar code field of said second bar code indicates that the data in the second bar code field of said second bar code relates to data related to an action and included the first bar code field of said first bar code.

14. A system in accordance with claim 13 wherein:

said indication by said data in the second bar code field of said first bar code is provided by said data in the second bar code field of said first bar code being one of a null and a preselected character or characters;

and said indication by said data in the first bar code field of said second bar code is provided by said data in the first bar code field of said second bar

code being one of a null and a preselected character or characters.

15. A system in accordance with claim 11 wherein:

said indication by said data in the second bar code field of said first bar code is provided by said data in said second bar code field of said first bar code being one of a null and a preselected character or characters.

16. A system in accordance with claim 10 wherein:

the data in the first bar code field of a first bar code indicates that the data in the second bar code field of said first bar code relates to data related to an action and included in the first bar code field of second of said plurality of bar codes;

and said processing means upon said first bar code and said second bar code being read enables the performance of the action related to the data in the first bar code field of the second bar code based on the data in the second bar code field of the first bar code.

17. A system in accordance with claim 16 wherein:

said indication by the data in said first bar code field of said first bar code is provided by said data in the first bar code field of said first bar code being one of a null and a preselected character or characters.

18. A system comprising:

at least one bar code, each bar code including a plurality of bar code fields, each of said fields including one or more bar code characters, a first bar code field containing data related to at least an action to be performed and a second bar code field containing data related to the data in said first bar code field;

means for reading a bar code to separate the fields of said bar code;

processing means responsive to said reading means for processing the data in said first and second fields of each said read bar code;

said reading means including a unique identification code;

and said processing means before processing the bar code fields read by said reading means must receive from said reading means said unique identification code.

19. A system in accordance with claim 6, 8, 10, 11 or 18 further comprising:

a telephone network for enabling a communication path to be established between said reading means and said processing means.

20. A system in accordance with claim 19 further comprising:

a telephone station

a telephone line connecting said station and said reading means to said telephone network.

21. A system in accordance with claim 20 wherein:

said reading means couples signals indicative of the data in the fields of a read bar code to said telephone line for transmission over said communication path to said processing means.

22. A system in accordance with claim 21 wherein:

said communication path is a voice path; and said signals comprise DTMF tones.

23. A bar code including a plurality of bar code fields, each of said fields including one or more bar code characters each of which is one of reflective and non-reflective, said bar code fields including a start field at the beginning of said bar code, a stop field at the end of said bar code and a separator field between said stop and start fields, said separator field including a character which is one of reflective and non-reflective and of a width which exceeds the width of any of the other bar code characters included in said bar code.

24. A bar code in accordance with claim 23 wherein:

said character of said separator field has a width in the range of three to five time the width of the widest of the other bar code characters included in said bar code.

25. A bar code in accordance with claim 23 wherein:

said character of said separator field has a reflective symbol therein.

26. A bar code in accordance with claim 23 wherein:

said bar code further includes a first non-reflective element bridging the top ends of all the characters of said bar code and a second non-reflective element bridging the bottom ends of all the characters of said bar code.

27. A method comprising:

providing at least one bar code, each bar code including a plurality of bar code fields, each of said fields including one or more bar code characters, a first bar code field containing data related to at least an action to be performed and a second bar code field containing data related to the data in said first bar code field;

reading a bar code to separate the fields of said bar code field;

processing the data in said first and second fields of each said read bar code;

said processing including enabling the performance of the action to which the data in said first field of a first bar code relates based on the data in the second field of said first bar code;

said data in said second bar code field of said first bar code indicating that the action to which data in said first bar code field of said first bar code relates is to be carried out based on further data which is other than said data in the second bar code field of said first bar code;

and said processing enabling the performance of the action to which the data in the first bar code field of said first bar code relates based on said further data.

28. A method in accordance with claim 27 wherein:

said indication is provided by said data in said second bar code field of said first bar code being one of a null and a preselected character or characters.

29. A method comprising:

providing at least one bar code, each bar code including a plurality of bar code fields, each of said fields including one or more bar code characters, a first bar code field containing data related to at least an action to be performed and a second bar code field containing data related to the data in said first bar code field;

reading a bar code to separate the fields of said bar code field;

processing the data in said first and second fields of each said read bar code;

said data in said first bar code field of a first bar code indicating that the data in said second bar code field of said first bar code relates to further data which is related to an action and which is in other than in said first bar code;

and said processing enabling the performance of the action which said further data relates based on the

data in said second bar code field of said first bar code.

30. A method in accordance with claim 29 wherein:

said indication is provided by the data in said first bar code field of said first bar code being one of a null and a preselected character or characters.

31. A method comprising:

providing at least one bar code, each bar code including a plurality of bar code fields, each of said fields including one or more bar code characters, a first bar code field containing data related to at least an action to be performed and a second bar code field containing data related to the data in said first bar code field;

reading a bar code to separate the fields of said bar code field;

processing the data in said first and second fields of each said read bar code;

said data in said first bar code field of a first bar code relating to a first action in a first reading of said bar code and to a second action in a second reading of said first bar code;

said reading step including making first and second readings of said first bar code;

and said processing enabling the performance of said first action in response to said first reading of said first bar code and said second action in response to said second reading of said first bar code.

32. A method comprising:

providing at least one bar code, each bar code including a plurality of bar code fields, each of said fields including one or more bar code characters, a first bar code field containing data related to at least an action to be performed and a second bar code field containing data related to the data in said first bar code field;

reading a bar code to separate the fields of said bar code field;

processing the data in said first and second fields of each said read bar code;

the data in the second bar code field of a first bar code indicating that the action to which the data in the first bar code field of said first bar code relates is to be carried out using the data in the second bar code field of a second of said plurality of bar codes; and

said processing upon said first bar code and said second bar code being read enabling the performance of the action to which the data in the first field of said first bar code relates based on the data in the second bar code field of said second bar code.

33. A method in accordance with claim 32 wherein:

when said reading step causes said first bar code to be read before said second bar code, said processing fails to enable performance of the action related to the data in the first bar code field of said second bar code.

34. A method in accordance with claim 32 wherein:

the data in the first bar code field of said second bar code indicates that the data in the second bar code field of said second bar code relates to data related to an action and included the first bar code field of said first bar code.

35. A method in accordance with claim 34 wherein:

said indication by said data in the second bar code field of said first bar code is provided by said data in the second bar code field of said first bar code being one of a null and a preselected character or characters;

and said indication by said data in the first bar code field of said second bar code is provided by said data in the first bar code field of said second bar code being one of a null and a preselected character or characters.

36. A method in accordance with claim 32 wherein:

said indication by said data in the second bar code field of said first bar code is provided by said data in said second bar code field of said first bar code being one of a null and a preselected character or characters.

37. A method comprising:

providing a plurality of bar codes, each bar code including a plurality of bar code fields, each of said fields including one or more bar code characters, a first bar code field containing data related to at least an action to be performed and a second bar code field containing data related to the data in said first bar code field;

reading a bar code to separate the fields of said bar code field;

processing the data in said first and second fields of each said read bar code;

the data in the first bar code field of a first bar code indicating that the data in the second bar code field of said first bar code relates to data related to an action and included in the first bar code field of a second of said plurality of bar codes;

and said processing means upon said first bar code and said second bar code being read enabling the performance of the action related to the data in the first bar code field of the second bar code based on the data in the second bar code field of the first bar code.

38. The method in accordance with claim 37 wherein:

said indication by the data in said first bar code field of said first bar code is provided by said data in the first bar code field of said first bar code being one of a null and a preselected character or characters.

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